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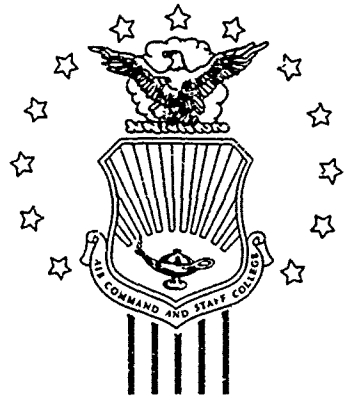

AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

"SAC NEEDS A FEW GOOD MEN AND WOMEN"
A GUIDE TO ICBM OPERATIONS DUTY

MAJOR RAYMOND E. EBBS 88-Ø825

"insights into tomorrow"

REPORT NUMBER 88-Ø825

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This handbook provides information on the Missile Operations career field for prospective ICBM launch officers. The handbook contains information on why prospective missileers might want to enter the career field, what missile duty is, career progression, follow-on assignments, initial entry requirements, training, and evaluations. It provides a brief introduction to each of the six operational ICBM bases, including information on location, activities/attractions, and the climate. The handbook contains a chapter on the evolution of today's ICBMs, current missile forces, and proposed ICBM weapon systems.

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THE NEED FOR A HANDBOOK ON MISSILE OPERATIONS DUTY

My research project is an introductory handbook designed to acclimate prospective missile combat crewmembers about what to expect from SAC ICBM operations duty. A review of the literature on missile operations duty reveals that much has been written on the missile career field. However, there is one major limitation. Most of the information is directed at those who are already missileers and little is published to educate prospective missileers about missile launch officer duties and career field opportunities. This research project is designed to fill this void. In addition, recent changes in personnel policy for selecting SAC missile crewmembers highlight the need for basic information on missile operations duty to aid in crewmember recruiting efforts. These personnel policy changes are 1) the opening of Minuteman crew positions to women, 2) selecting only volunteer crossflow officers for ICBM crew duty, and 3) the CINCSAC established goal of integrating 25 Air Force Academy graduates per year into the missile operations career field. This paper will illustrate why these personnel policy changes result in a need for a guide to ICBM operations duty, one specifically targeted at prospective missileers.

Information abounds on the duties, responsibilities, and opportunities in missiles for those already in the career field, but little is available to explain missile operations duty for those considering SAC ICBM duty as their initial duty assignment. There are handbooks for Minuteman crewmembers, crew commanders, missile career management, career progression, and career development. The most recent handbook on SAC missile duty specifically designed for accessions was written in 1985 (4:--). Since then, several changes occurred that reduce this handbook's effectiveness. These changes include the addition of the Peacekeeper weapon system to SAC's ICBM arsenal, the recently signed Intermediate Range Nuclear Force (INF) Treaty (soon to eliminate the Ground Launched Cruise Missile system), a major overhaul of the Minuteman Education Program, and the requirement to serve as a missile launch officer before becoming a missile maintenance officer. In addition to these changes, missile personnel policy enacted since the old handbook was published established a need to recruit women, crossflows, and Academy graduates for missile operations duty.

In February 1985, CINCSAC announced the opening of Minuteman crew duty to women on a gender-specific basis, i.e., all-female crews. As a result of the management and scheduling difficulties associated with the gender-specific concept, SAC determined that 20% of the missile crew force needed to be women for the program to work (2:32). This equates to 240 women. Since February 1985, SAC has recruited less than 50 women for the program. Although SAC recently altered the gender-specific concept to permit integrated crews (men and women on the same crew), mixed crews are voluntary and require the consent of both the male and female

crewmember. Thus, SAC continues to maintain the 20% requirement (3:--). This author's handbook will aid in the recruitment of women to SAC missile operations by providing specifically tailored information on missile operations duty to female Air Force accessions and women in other career fields who may have a desire to obtain operations experience.

Historically, SAC requested and received approximately 100-120 Air Force officers each year from other career fields to serve on ICBM crews. These officers, with 3-7 years experience, provided maturity and leadership to a very young (first and second lieutenant) crew force. This policy was changed in 1985 to a policy where only volunteers were selected to career broaden into the missile crew force. This change resulted from a reluctance to force non-volunteers to serve as missile launch officers. As a result, only 40-60 experienced officers volunteer each year for missile crew duty (3:--). By providing HQ AFMPC resource managers with a guide to ICBM operations duty, accurate information can be passed to officers in other career fields which may convince them to spend a tour of duty in missile operations and thus increase the maturity of the SAC crew force.

Entrants into ICBM operations duty from the Air Force Academy dwindled in the 1980's to an all-time low of two in 1986. CINCSAC, in response to this decline, established a goal of 25 cadets per year into missile operations (1:--) and tasked his staff to develop a recruiting plan. HQ SAC/DPX interviewed Academy graduates stationed at HQ SAC (missile and non-missile) as well as HQ USAFA staff and cadets to determine why efforts to recruit academy graduates were failing. The two primary reasons cited were first, non-flying qualified cadets wanted to enter career fields where they could apply their education and, second, a lack of information available on missile operations duty. HQ SAC/DPX developed several recruiting initiatives to reach the CINCSAC goal. One of these initiatives is to provide cadets with an informational handbook or guide on missile operations duty to aid in their career choices (3:--). My research project will complete this initiative.

Inadequate information on the duties, responsibilities, and opportunities available in SAC missile operations has resulted in a failure to achieve desired recruiting goals. The purpose of my research project is to fill this information gap by developing a handbook on SAC missile operations duty for prospective launch officers. This handbook will assist the Strategic Air Command in their recruitment of women, experienced Air Force officers, and Academy cadets into the ICBM operations career field.

2 Appendices
1. Needs Assessment Bibliography
2. Handbook for Missile Operations Duty

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PREFACE

The purpose of this handbook is to provide prospective missile launch officers with enough information to decide if missile operations is right for them. Based on my own experience as a missile operations officer and from discussions with many others in the missile specialty, I believe missiles offers numerous challenges and opportunities for future Air Force officers.

Information about many Air Force specialties is widely available because there are corresponding civilian equivalents (pilot, navigator, air traffic control, engineering, weather, aircraft maintenance, communications, personnel, etc.). However, this is not the case for missile launch officers. This guide is designed to fill the void by providing an introduction to Intercontinental Ballistic Missile (ICBM) operations duty and missile career opportunities.

The author wishes to express his appreciation to Colonel Dan Donovan, HQ SAC/DPX, for sponsoring this project. In addition, thanks are extended to Major Bill Dingwall and Capt Bill Colwell, HQ SAC/DPXPM, who were the primary sources for the information contained in this handbook. Finally, I would like to recognize Lt Colonel J. R. Grellman, ACSC faculty advisor and long-time missileer, for his assistance and timely advice during the development of this research project.

This document will be published as a SAC missile operations handbook after review and approval of its content by HQ SAC. Upon approval, copies of this handbook will be provided to HQ AFROTC, HQ USAFA, HQ Recruiting Service, and HQ AFMPC to aid in missile operations recruiting efforts. Comments and recommendations may be made directly to HQ SAC/DPX, Offutt AFB NE 68113-5001 (Autovon 271-3280).

ABOUT THE AUTHOR

MAJOR RAYMOND E. EBBS

Major Ebbs received a Bachelor of Business Administration Degree in Business Management from Kent State University, Kent, Ohio, in 1972 and a Master of Science Degree in Systems Management from the University of Southern California in 1982. He was commissioned through Officer Training School at Lackland AFB, Texas, in 1975. Major Ebbs completed Squadron Officer School by correspondence and in-residence, and Air Command and Staff College (ACSC) by correspondence, prior to entering ACSC in-residence.

Major Ebbs is an experienced missile operations officer, spending his entire service time (13 years) in missile-related duties. He holds the Master Missileman Badge. After operational readiness training in 1975, he was assigned to the 381st Strategic Missile Wing, McConnell AFB, Kansas, in the Titan II weapon system. His missile crew assignments include deputy, alternate command post deputy, instructor deputy, and senior instructor deputy.

In 1978, he was selected for instructor duty at the 4315th Combat Crew Training Squadron where he served as a Titan II Missile Procedures Trainer instructor and Chief of the Analysis Unit. In 1981, Major Ebbs was selected for an Air Staff Training (ASTRA) tour at the Air Force Inspection and Safety Center (AFISC), Norton AFB, California. While at AFISC, he served as a Minuteman and Titan II weapons safety program manager. In 1982, he was assigned to the Air Force Operational Test and Evaluation Center (AFOTEC) ICBM Test Team, serving as a MX Test Integration Manager. Prior to arriving at ACSC, Major Ebbs worked at HQ SAC as a Missile Personnel Plans officer.

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INTRODUCTION

It is my great honor, as the military commander of our nation's ICBM force, to introduce you to missile operations duty. SAC's missile combat crewmembers are highly trained and dedicated professional men and women who work in one of the most important and demanding career fields in the Air Force. After completing a rigorous training program, missile launch officers are assigned to operational missile wings as a member of a missile combat crew. On alert at launch control facilities, the mission of the SAC missile crew force is clear: be prepared 24 hours a day 365 days a year to launch one or more of their ICBMs toward distant enemy targets upon receipt of orders initiated by the President of the United States. The duty of these select men and women is essential to the deterrence role of our ICBM fleet and vital to the defense of our nation. I know of no more important duty in the United States Air Force.

John T. Chain, Jr.
General, USAF
Commander in Chief

Chapter One

WHY MISSILE DUTY?

MISSION

The mission of the Strategic Air Command's (SAC) ICBM forces is to maintain peace and freedom for the people of the United States and our allies. "Deterrence of war is the primary goal of United States strategic policy and the principal function of our nuclear forces" (2:808). SAC land-based ICBMs, along with SAC manned bombers and Navy sea-launched ballistic missiles, comprise the Strategic Triad. This Triad provides the power and flexibility needed to deter our enemies from acts of aggression against us and our allies. The potential destructive power of nuclear weapons and the flexibility provided by the air-, land-, and sea-based systems of the Triad constitute the instruments of United States deterrence policy.

The mere presence of the Triad, however, is not sufficient to discourage potential antagonists from acts of aggression. Deterrence requires not only the presence of sophisticated weapon systems, but also the will and ability to use these weapons when ordered to do so by the President of the United States (22:6). The ability to properly use our ICBM forces is the responsibility of the SAC missile combat crew. Highly trained and professional men and women stand ready 24 hours a day to launch Minuteman and Peacekeeper missiles in order to preserve the freedoms of democratic people around the world. This is the crucial mission of the missile combat crewmember. A launch of a Minuteman missile is illustrated in Figure 1.

OPERATIONS CAREER FIELD

Air Force officers are classified into two basic career areas: operations and support. Operations represent the "combat arm" of the Air Force, while support assists the weapon system operators in performing the mission. There are seven career fields in operations and twenty career fields in support. The seven operations career fields are pilot, navigator, missile operations, space operations, air traffic control, air weapons director, and operations management. Support functions include

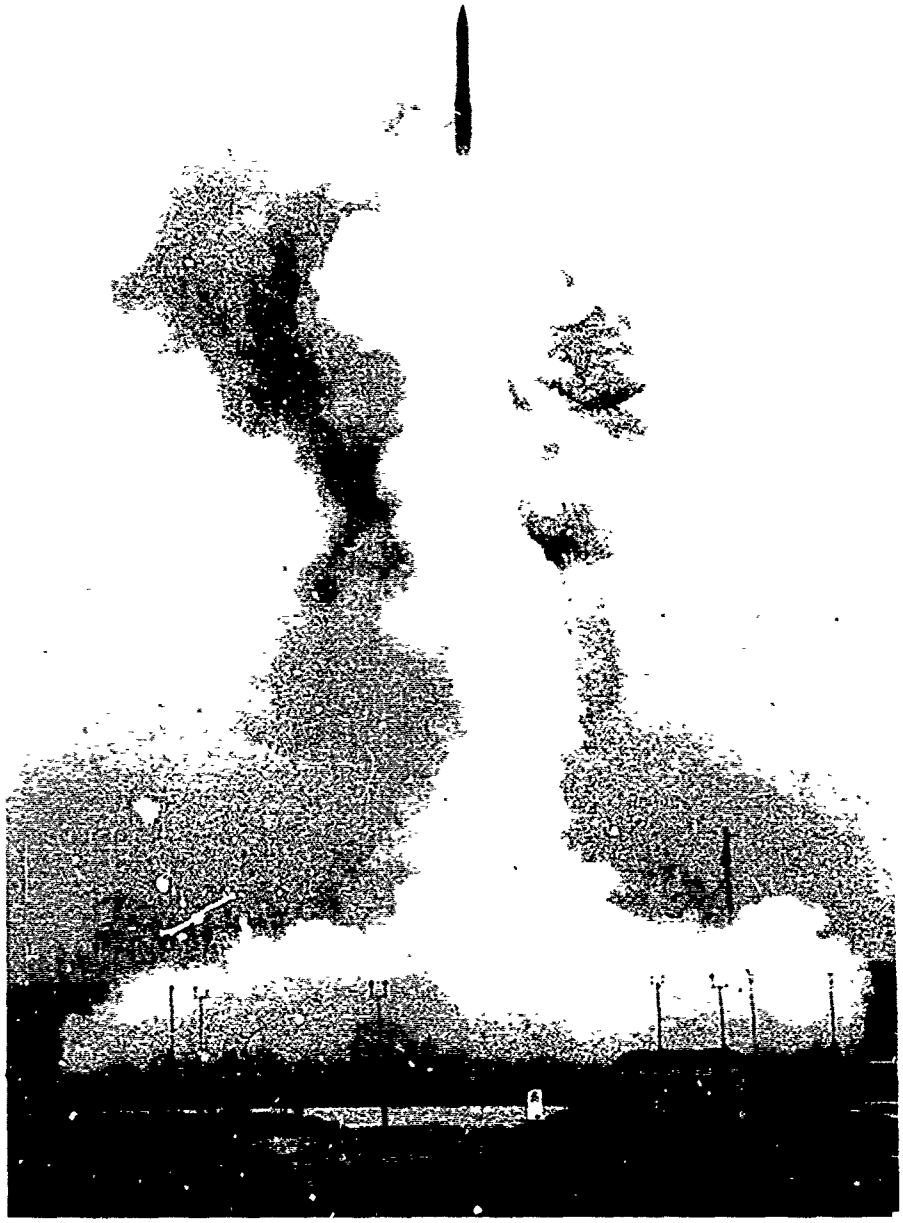

Figure 1. Minuteman Launch (48:-).

logistics, intelligence, security police, civil engineering, legal, weather, and others (20:--). Thus, the missile career field provides men and women the opportunity to gain operational experience in the combat arm of the United States Air Force.

EARLY COMMAND EXPERIENCE

Individuals serving in the missile operations career field have the opportunity to gain valuable leadership and command experience very early in their Air Force careers, usually during their initial duty assignment. Many first lieutenants and most captains progress to the position of missile combat crew commander after only 18-24 months as a deputy commander. In addition, most of today's senior missile officers started their Air Force career in missiles. Almost all missile squadron and wing commanders have served as missile combat crewmembers (35:-).

OPPORTUNITIES FOR WOMEN

When the Commander-in-Chief of SAC opened Minuteman and Peacekeeper missile crew positions to women in February 1985 (34:--), all restrictions on the employment of women officers in the missile career field were removed. Today, women officers can hold any job in missiles from missile combat crewmember to missile maintenance officer to missile wing commander.

MISSILE CREWMEMBER EDUCATION PROGRAM

The Missile Crewmember Education Program (MCMEP) provides a unique opportunity for missile combat crewmembers to attain an advanced degree at no cost. The MCMEP is an Air Force funded education program conducted by civilian educational institutions at all six SAC operational missile bases. Only missile crewmembers are eligible for full funding in the MCMEP. Crewmembers may participate in any locally available, regionally accredited graduate program and the Air Force pays for 100 percent of the tuition and book costs. The Air Force also pays for any undergraduate courses and books required for admission to graduate studies. In addition, classes are integrated into the crewmember's duty schedule. Participants in the MCMEP must possess a baccalaureate degree in any field and meet admission standards for the college in which they desire to enroll. Individuals who enroll in the MCMEP incur a 2-year active duty service commitment which begins after completion of the last course and runs concurrently with any other commitment (38:--).

Crewmembers can work on their graduate programs during missile alert tours. However, operational requirements and other assigned duties must come first. Although there is some time available to study while on alert, crewmembers usually need additional off-duty study time to prepare for their classes. Most MCMEP graduate education programs can be completed in less than 24 months. Since launch control officers normally serve

four years on crew, reassignment should not occur before completing degree requirements. If for some reason an officer is unable to complete his/her graduate program, they can request an educational extension to complete their degree (17:67).

Appendix A identifies the universities currently participating in the MCMEP and the degrees offered (14:--; 33:--). New programs continue to be added, so contact the base education offices at the phone numbers listed in Appendix A for changes or additional information on the MCMEP.

CAREER OPPORTUNITIES

Positions from second lieutenant through colonel and even beyond exist for SAC missile operations officers. General officers are awarded a unique Air Force Specialty Code and are not affiliated with any specific weapon system authorization; thus, generals are not included in the following numbers. There are approximately 2165 positions in SAC missile operations (35:--). This number equates to 1225 crewmembers, 340 unit staff (six strategic missile wings), 350 intermediate staff (4315th Combat Crew Training Squadron, 3901st Strategic Missile Evaluation Squadron, and the 2nd and 4th Airborne Command and Control Squadrons), and 250 higher headquarters staff (air division, numbered air force, and HQ SAC). In addition, there are opportunities for missileers in almost every major command in the Air Force, as well as at Headquarters United States Air Force (10:--).

PROMOTIONS

Historically, SAC missile officers have done well on promotion and school selection boards. This is a result of the importance of their mission, early command experience, advanced academic degree opportunities available in the missile career field, and most importantly, the performance of missile officers. In recent years, missile operations promotion rates have exceeded the Air Force average. Compared with flying officers, missile operations officers have usually exceeded the promotion rates of navigators, and equalled or been only slightly below that of pilots. Promotion rates for missile operations personnel have been significantly higher than support officers (35:--).

However, the primary factor influencing promotion and progression is not the career field you are in, but your performance. The record you establish in each position you hold determines promotion and progression opportunities. Duty as a missile operations officer provides many challenges. If you meet these challenges head on and perform well, you will establish a

record that speaks for itself. Your performance will determine your ability to progress from deputy crew commander to crew commander to unit staff to higher headquarters to senior missile command positions. Promotion and job advancement opportunities are available in missile operations for those men and women who strive to be the best they can be.

Chapter Two

WHAT IS MISSILE DUTY?

ICBM CREW DUTY

Missile operations officers begin their Air Force careers as missile combat crewmembers serving a 4-year stabilized tour at one of six SAC missile bases. The primary duty of ICBM crewmembers is to be prepared to launch their missiles toward enemy targets when directed by the President of the United States, a task not to be taken lightly. As a result, much emphasis is placed on training and evaluation to ensure a crewmember's readiness. However, the duties of missile launch officers go beyond turning the keys which launch our ICBM force. Let's take a look at an ICBM crew and their responsibilities. A missile crew consists of two officers, a deputy missile combat crew commander (DMCCC), and a missile combat crew commander (MCCC). In most cases, an individual will be initially assigned as a DMCCC.

The deputy assists the commander in monitoring the status of missile systems (anywhere from 10 to 50 missiles), making sure that all related equipment is operational. He or she practices emergency, malfunction, and launch procedures (19:A8-65; 25:18). As assistant to the commander, the deputy monitors communications to and from the launch control facility and launch facilities (6:18). The launch control facility houses the missile crew and associated launch equipment and is buried some 60-90 feet below ground (see Figure 2). The launch facility is where the alert ready missile is located and is several miles away from the launch control facility (see Figure 3). The deputy also records the status of missile equipment, maintenance activities, and communications. In summing up the duties of a deputy, we can say he or she is learning to be a missile crew commander.

The MCCC commands the missile crew and all activities in the launch control center. The commander supervises the DMCCC, as well as the activities of maintenance personnel and visitors to his/her missile facilities. He/she is in command of the missiles in his/her flight and is responsible for the safe operation of all systems in the launch control center. While on alert, the commander exercises direct command and control during any

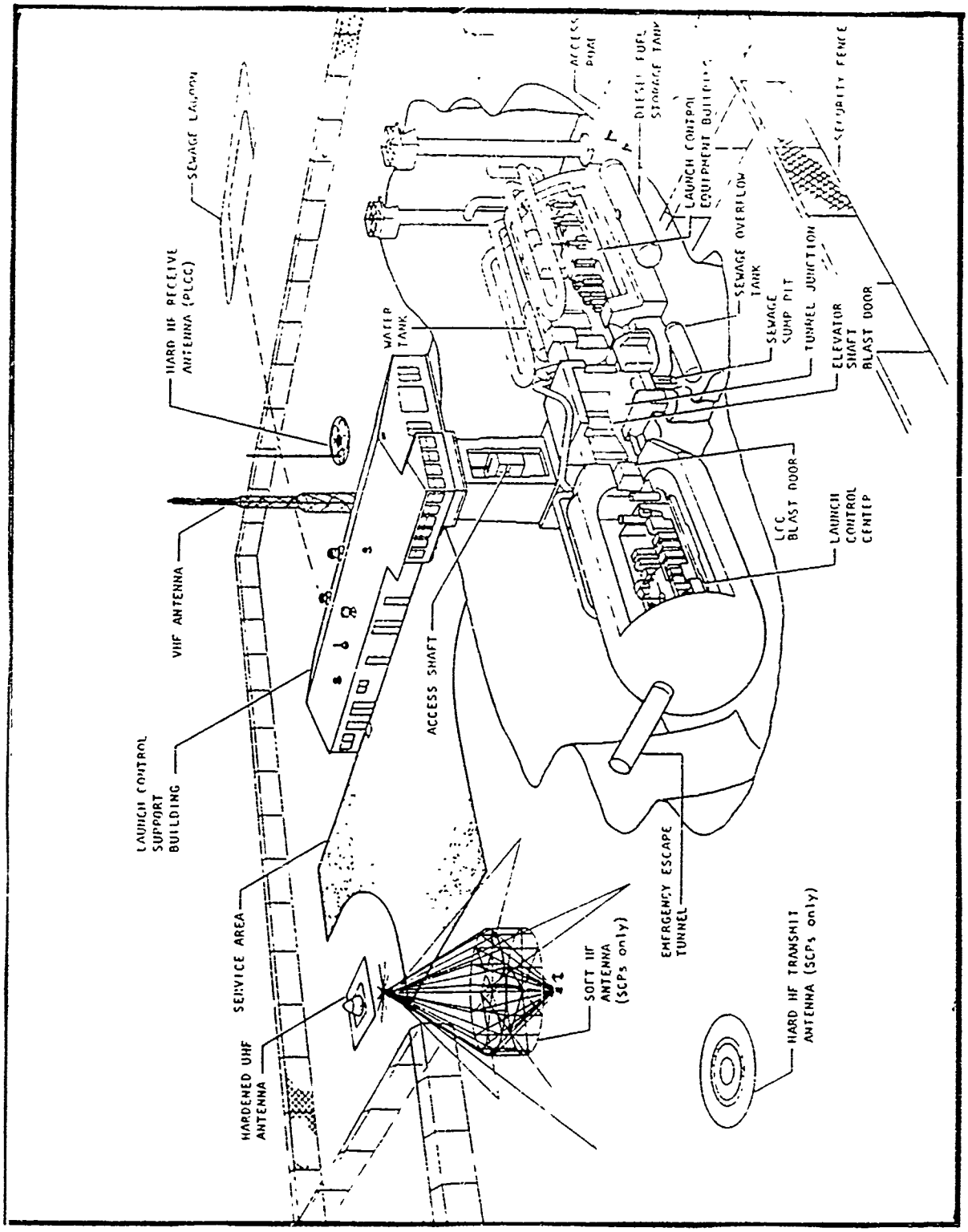

Figure 2. Launch Control Facility (47:2-6).

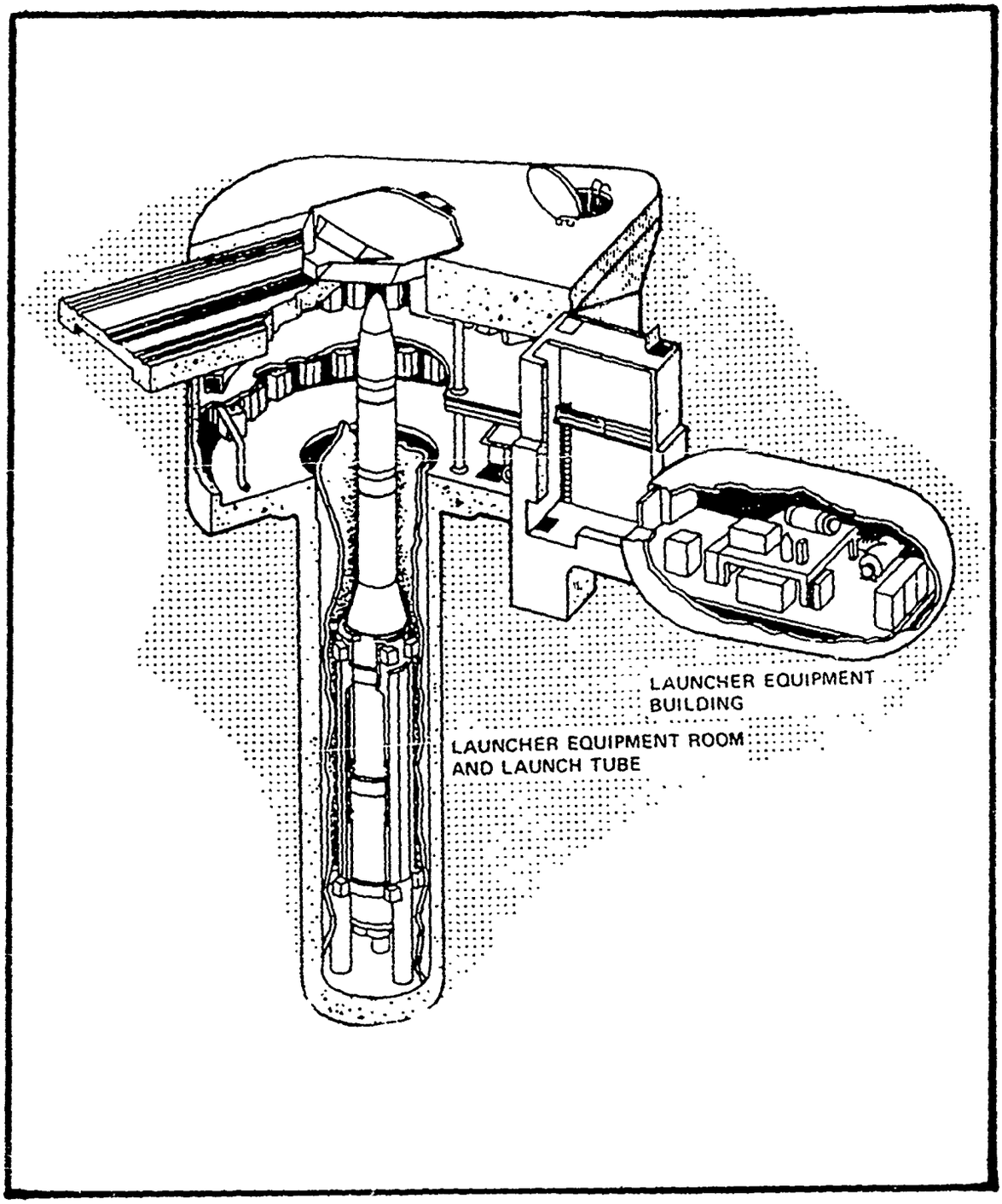

Figure 3. Launch Facility (47:2-7).

situation which involves personnel or equipment safety (7:4-1). The commander's duties include alert monitoring, readiness checks, and maintenance coordination and inspections. He/she implements applicable procedures to ensure missile systems and missile related equipment are working properly and are constantly ready for launch (19:A8-65; 25:19). In addition, the commander has final responsibility for proper crew reaction to and compliance with Air Force, SAC, and unit directives pertinent to the crew. Finally and above all, the commander ensures that a high degree of crew proficiency and professionalism is maintained (25:19).

ALERT DUTY

What is ICBM alert duty? Although all alerts are somewhat different, there are some common events which occur on the days crewmembers are scheduled for alert duty (23:20). The day begins with an early morning predeparture briefing from the wing staff. This formal briefing informs the crews of significant activities going on at the missile wing and specifically at their launch control facility and associated missile silos (called launch facilities). As a minimum, information is presented on major maintenance activities, periodic maintenance activities, usual or abnormal security requirements, unusual weather conditions, and pertinent safety information. All crewmembers scheduled for alert must attend a predeparture briefing, usually all at the same time (7:3-1). After the predeparture briefing, the crew begins a drive or helicopter flight to their launch control facility. If the crew drives, it can take anywhere from 30 minutes to three hours to reach their launch control facility, depending on the distance to the site.

Once the crew arrives at their launch control facility, they perform security and identification procedures. If these procedures are accomplished correctly, the crew will be permitted access to the elevator for the trip down to the launch control center. The crew coming on alert relieves the crew on duty, a process called crew changeover. Crew changeover takes about 30 minutes and includes a briefing from the on-duty crew on the status of missiles in the flight and squadron (10 missiles in a flight and 50 missiles in a squadron), inventory of classified material, and various administrative details. The crew assumes command of the flight when they sign the forms accepting responsibility for the alert. The next 24 hours will be spent monitoring and controlling maintenance and security teams, conducting inspections and tests on assigned missiles and launch control center equipment, sleep shifts, crew study, and personal time (23:20-21). Some alerts are busier than others. Typically, there is less activity on weekends and holidays. Sleep shifts vary, but crewmembers can expect about four to six hours of sleep

during each 24-hour alert duty tour.

Crew commanders determine how the crew uses their alert time, but wise crews spend it productively. They study their technical data, work on procedures, and prepare for evaluations as a team, and the best place to do that is on alert (23:21). Alerts are also a good place to work on professional military education courses and advanced academic degrees. Accomplishing these activities on alert will leave more time for crewmembers to spend with their families and for other personal activities. Figures 4 and 5 depict crewmembers at work.

CREWMEMBER'S SCHEDULE

Missile combat crewmembers do a lot more than "pull" alerts. The monthly crew schedule contains not only six to eight 24-hour alerts, but also training required to maintain proficiency and other collateral activities (51:--). The training necessary to maintain proficiency is called recurring training and requires three or four days each month (9:5-1). This training consists of weapon system training, emergency war order (EWO) training, code handler training, and a "ride" in a missile procedures trainer (MPT). The Weapon System Training Branch (DOTI) conducts one day of classroom training each month to instruct crewmembers on new procedures and to ensure that crewmembers maintain the highest possible level of weapon system knowledge. Crewmembers are also trained on code handler duties by the Codes Division (DO9) once a month. This training lasts about an hour and normally occurs on the same day as weapon system training. A second day is scheduled for the EWO Training Branch (DO22) to instruct crewmembers on EWO concepts and procedures. A third day is usually reserved for a recurring MPT period, conducted by DOTI instructors. MPT rides last about four hours and allow crewmembers to apply their weapon system, EWO, and codes training to improve their day-to-day and wartime proficiency skills (9:-). A fourth day may be needed for miscellaneous activities such as commander's call, small arms training, safety training, medical/dental exams, records review, etc. (51:--; 23:21).

This looks like a lot of training and it is, but it is also necessary because the job is complex and proficiency requirements are very high. The primary purpose of all this training is to ensure crewmembers maintain the skills necessary to accomplish the mission (23:21). Figure 6 illustrates a typical monthly schedule.

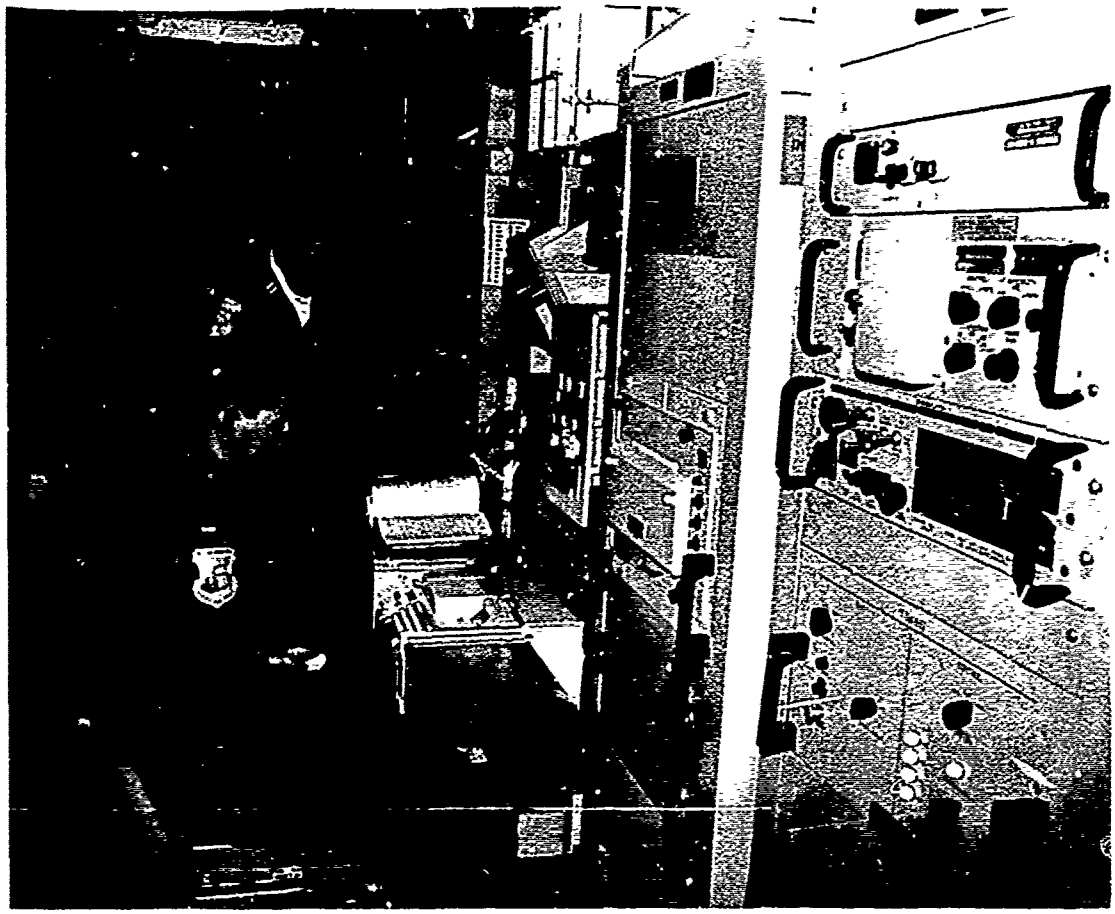

Figure 4. ICBM Crew At Deputy's Console (53:--).

CAREER PROGRESSION

A vast number of varied opportunities are available in the missile career field for those who excel. Opportunities for missileers exist in nearly every major command in the Air Force, as well as at Headquarters United States Air Force. Missile officers occupy every rank from second lieutenant through colonel and even beyond. Because of the variety of job opportunities in missiles, there is no single path to success. However, to provide you with an idea of what you could expect from a career in missile operations, we will discuss, in general terms, the progressive development of a career missile operations officer (23:43).

Career progression in missiles can be broken into five phases. These phases are somewhat arbitrary, but they provide

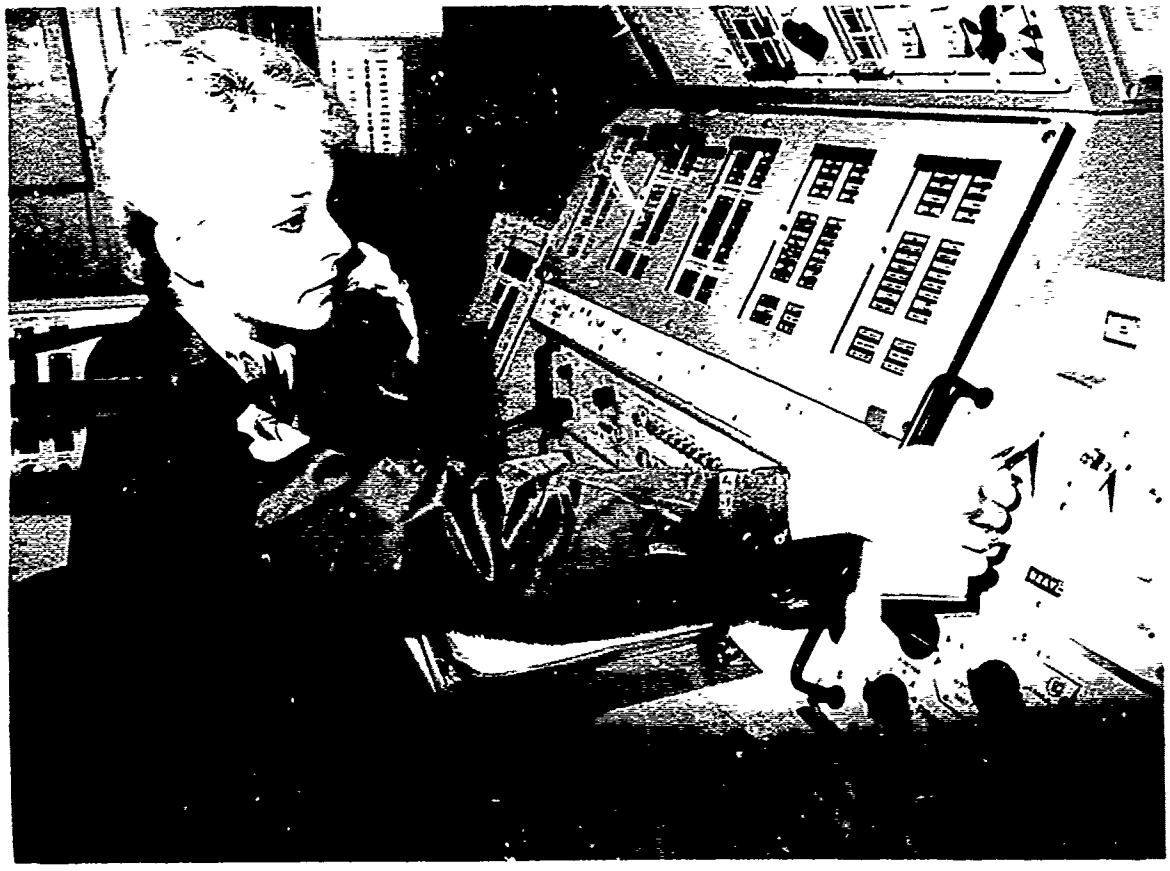

Figure 5. Crewmember at Work at Commander's Console (48:--).

insight into the opportunities lying ahead for missile operations officers (18:60-61; 23:43-44).

The first phase, from entry into the service through four years active duty, is spent as a missile launch officer. During this phase the officer will develop his or her skills in the weapon system, become familiar with operational procedures, and progress to crew positions of greater responsibility. Initial assignment will be to deputy combat crew commander. Officers who demonstrate the capability to accept increased responsibility will upgrade to combat crew commander after 18-24 months on crew. Exceptional launch officers will move to alternate command post, instructor, and evaluator positions. Crewmembers displaying extraordinary leadership qualities and the ability to effectively manage resources will be assigned as squadron flight commanders. Flight commanders are responsible for the overall control of all activities in their flight including command of assigned combat

SUN	MON	TUE	WED	THUR	FRI	SAT
		[1] A	[2] O	[3] E	[4] OFF	[5] A
[6] O	[7] t1	[8] A	[9] O	[10] E	[11] A	[12] O
[13] OFF	[14] A	[15] O	[16] t3/t4	[17] E	[18] B	[19] O
[20] OFF	[21] OFF	[22] OFF	[23] OFF	[24] E	[25] M	[26] T
[27] A	[28] O	[29] OFF	[30] A			

A--ALERT
B--STANDBY ALERT
E--MCMEP (optional)
M--COMMANDER'S CALL
O--CREW REST
T--MISSILE PROCEDURES TRAINER
t1--EMERGENCY WAR ORDER TRAINING
t3--WEAPON SYSTEM TRAINING
t4--CODES TRAINING

Figure 6. Typical Monthly Crew Schedule (51:--).

crews. Missile launch officers are encouraged to pursue a graduate degree through the Missile Crewmember Education Program during their crew tour (18:60; 23:43).

During the 5-11 year period, the second phase, missile operations officers will either continue to specialize in missile operations, career broaden into missile-related or other specialties, or retrain into another career field. Most officers who complete their crew tour will progress to missile staff positions of increased responsibility at wing or higher headquarters (18:60; 23:43). Some of these positions are described in the next chapter (Follow-On Assignments). Most of the missile-related staff assignments are described in SAC Pamphlet 35-3, Missile Career Opportunity Text (MCOT). The MCOT is a useful tool for missile officer career planning, as it details the requirements and locations of missile staff positions above wing level (23:43).

Officers who desire to expand their experience beyond missile operations will be considered for a career-broadening tour into missile related or other specialties. These include missile maintenance, operations management, disaster preparedness, personnel, and others including special duty assignments (18:9). Special duty assignments..."offer qualified officers the opportunity of serving in unique and challenging positions normally not available to most individuals in the course of their Air Force careers' (17:153). Special duty assignments normally occupied by missile officers include military aide for general officers, Air Staff Training (ASTRA) program, Education With Industry program, US Air Force Academy instructor, Air Force Reserve Officer Training Corps instructor, deputy commanders in the Basic Military Training School, Officer Training School instructor, faculty and staff positions at Squadron Officer School, and recruiting duty with the US Air Force Recruiting Service. AFR 36-20 details the qualifications for special duty assignments.

After completing their crew tour, some officers elect to retrain into other career fields. The difference between career broadening and retraining is that officers who career broaden return to their primary career field while officers who retrain remain in the career field into which they retrained. The ability to retrain is dependent upon the needs of the Air Force. If opportunities are available in the career field an individual desires to retrain into, and if there is a surplus of missile staff officers, a request to retrain is normally accommodated. During the 5-11 year phase, career officers should begin their professional military education by completing Squadron Officer School and attaining an advanced academic degree (18:60-62; 23:43).

In the advanced development phase, 12-16 years of service, officers advance into positions of increasing responsibility and scope. A significant consideration during this phase should be the rotation through different levels of command. Officers will be assigned to responsible staff positions at the wing, division, numbered air force, major command, HQ USAF, Joint Staff, and other specialized assignments. Career officers should continue their professional military education by completing intermediate service school (18:60-61; 23:43-44).

The fourth phase, senior staff, consists of the period of 17-21 years of service. Officers in this phase should acquire experience as commanders or key staff officers at all levels (unit, intermediate headquarters, major command, and HQ USAF). Officers with exceptional leadership ability will be selected as missile squadron commanders. HQ USAF will select the top performers for senior service school in residence. Those not chosen should enroll in senior service school seminars or correspondence programs (18:61-62; 23:44).

The executive or leader phase (the fifth and final phase) occurs at 22 years of service and beyond. Career missile officers who reach this point will occupy senior command and staff positions at all organizational levels. Some officers will serve as wing and higher level commanders. A select few will progress to general officer rank. Selected officers will attend executive short courses to continue to develop command and leadership skills (18:61-62; 23:44).

The career progression phases just discussed are not intended to lay out any single path to a successful missile career, but only to provide a very general idea of what a career in missiles might be like. All one needs to do is to look at the diverse careers of senior missile officers to discover that there are numerous paths to a successful career in missiles.

FOLLOW-ON MISSILE ASSIGNMENTS

There are a variety of job opportunities available to men and women who complete their missile crew tour and elect to remain in the missile career field. This section will provide a brief description of some of these opportunities. Keep in mind that there are also numerous career-broadening assignments (see section on Career Progression).

Missile Maintenance

Nearly all missile maintenance officers have previously served as missile operations officers, thus providing a knowledgeable and experienced maintenance officer corps. Missile

maintenance provides an excellent opportunity for missile operations officers to broaden their experience within the missile career field. Leadership and management skills are put to the test in this challenging specialty (23:46). The primary objective of missile maintenance is to keep the missiles on alert, ready to launch. Keeping missiles on alert requires effective and safe management of resources (people, equipment, funds, facilities, time, etc.) without compromising safety, security, or maintenance discipline. Control of the maintenance effort is centralized at the support base while specialized maintenance is performed at the missile silos and launch control facilities spread over thousands of square miles. The maintenance effort requires planning, organizing, coordinating, directing, and controlling by many people to be successful (11:33). To help you get a feel for the variety and complexity of missile maintenance activities, take a look at the organizational chart in Figure 7. One of the major benefits of obtaining missile maintenance experience is that it opens more opportunities for command. While an officer with missile operations experience may command an operations squadron, an officer with operations and maintenance experience has the opportunity and skills to command both operations and maintenance squadrons. Today many missile wing commanders have experience in both fields.

4315th Combat Crew Training Squadron

Many crewmembers who have instructor and/or evaluator experience seek challenges and rewards as an instructor at the 4315th Combat Crew Training Squadron, Vandenberg AFB, California. Instructors are hand-picked from the six missile wings to train future missile crewmembers. New instructors usually begin as missile procedures trainer (MPT) operators and then move up to instructor duty. The instructor's responsibility is to teach prospective missile crewmembers about the intricacies of weapon system operation and emergency war order skills (24:39). Besides the excellent base location and the rewarding duty as an instructor, the 4315 CCTS offers opportunities for upward mobility, increased responsibility, and staff experience for officers with high potential (23:47). These additional opportunities include duties in the following areas: academics, curriculum development, emergency war order training, space and missile presentations, training sciences, MPT management, and student administration (8:--).

Unit Operations Staff

The unit operations staff exists to support the missile crews and falls under the responsibility of the Deputy Commander for Operations (DO) (see Figure 8). Virtually all the people in the DO staff have missile experience; most were crewmembers at some

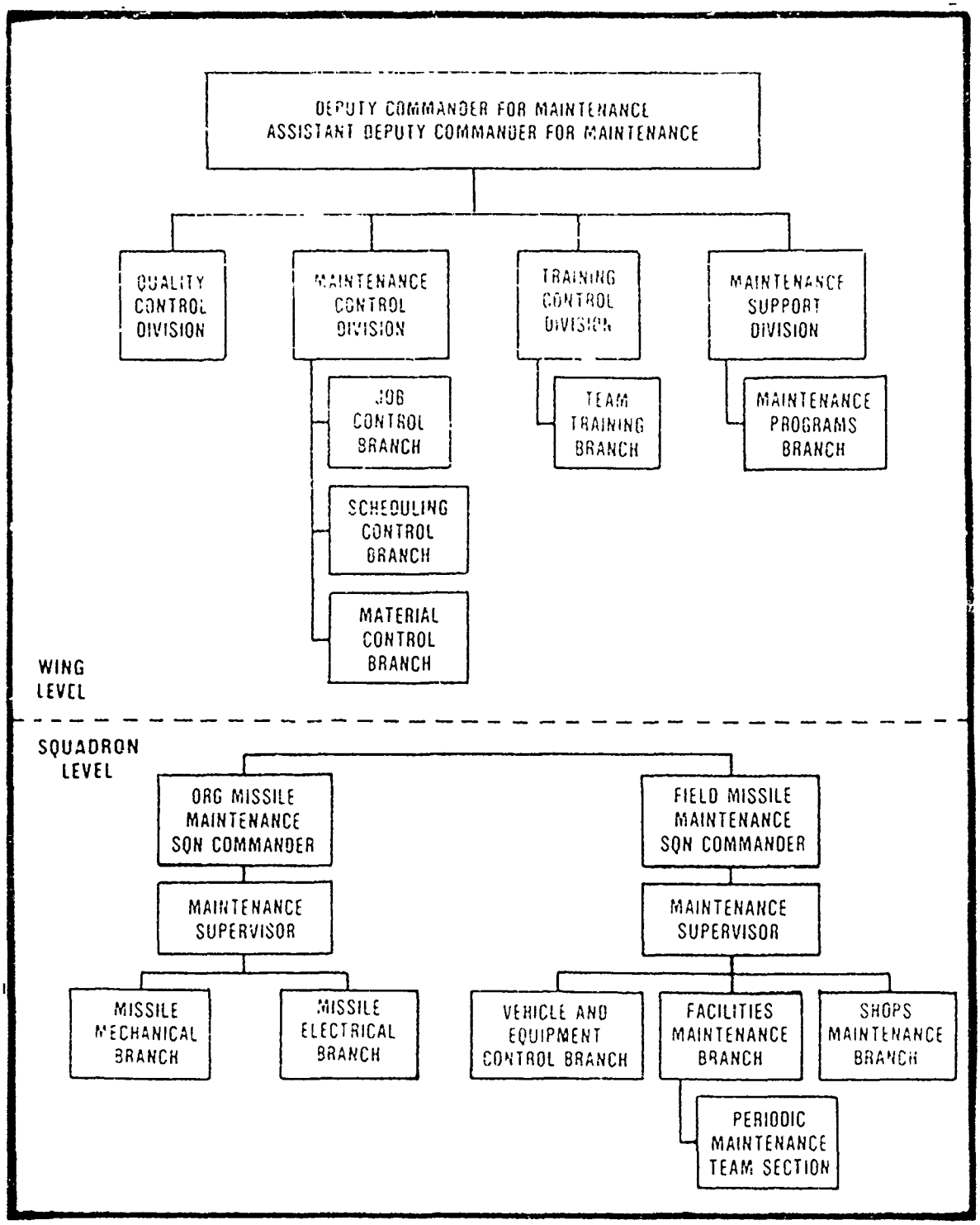

Figure 7. Unit Maintenance Organization (24:27).

time in the past. They know missile operations and have the ability to help crewmembers do the best job possible. The primary purpose of the unit operations staff is to advise and assist the wing commander in accomplishing the unit's mission. Now let's take a closer look at each of the operations divisions to give you a better idea of what job opportunities are available at the unit.

Training Division (DOT). The Training Division is responsible for establishing and implementing unit missile crew and operations staff officer training programs (9:2-1). Their primary objective is to provide effective combat-ready crews. DOT exists to get new crewmembers up to speed and then help keep them there. DOT is organized into three main branches: Weapon System Training, Missile Procedures Trainer, and Scheduling.

The Weapon System Training Branch conducts all formal weapon system training. Most of this training is provided on a recurring basis, normally once a month, and consists of classroom, MPT, and self-study training programs. Classroom and MPT training sessions are led by instructors, while the self-study portion is unsupervised and done on the crewmember's own time (23:38). Instructors are selected from the crew force based on their weapon system knowledge and communication skills. Instructor duty offers outstanding career enhancement opportunity as well as an excellent introduction to staff duty (23:38).

The MPT Branch maintains the launch control center simulator that provides crewmembers with realistic "hands-on" experience (23:38). Opportunities exist to supervise MPT operators and maintenance personnel for those seeking unit staff experience.

The Scheduling Branch creates and publishes the weekly and monthly crew schedules. Scheduling officers determine where and when crewmembers pull alerts, receive training, and other miscellaneous activities. Most importantly, schedulers determine when crewmembers have a day off (23:38).

Standardization and Evaluation Division (DOV). This division establishes and monitors the wing standardization and evaluation program. DOV conducts realistic and objective evaluations of crew force proficiency and reviews training materials for accuracy (6:--). Thus, evaluators assist unit commanders by ensuring adequate crew operating procedures and proficiency are maintained. Evaluators are selected from the crew force and are among the most proficient and professional crewmembers at the unit (23:38-39).

Plans and Intelligence Division (DO22). DO22 assists the crewmember in maintaining proficiency in Emergency War Order concepts and procedures as well as all related plans, targeting

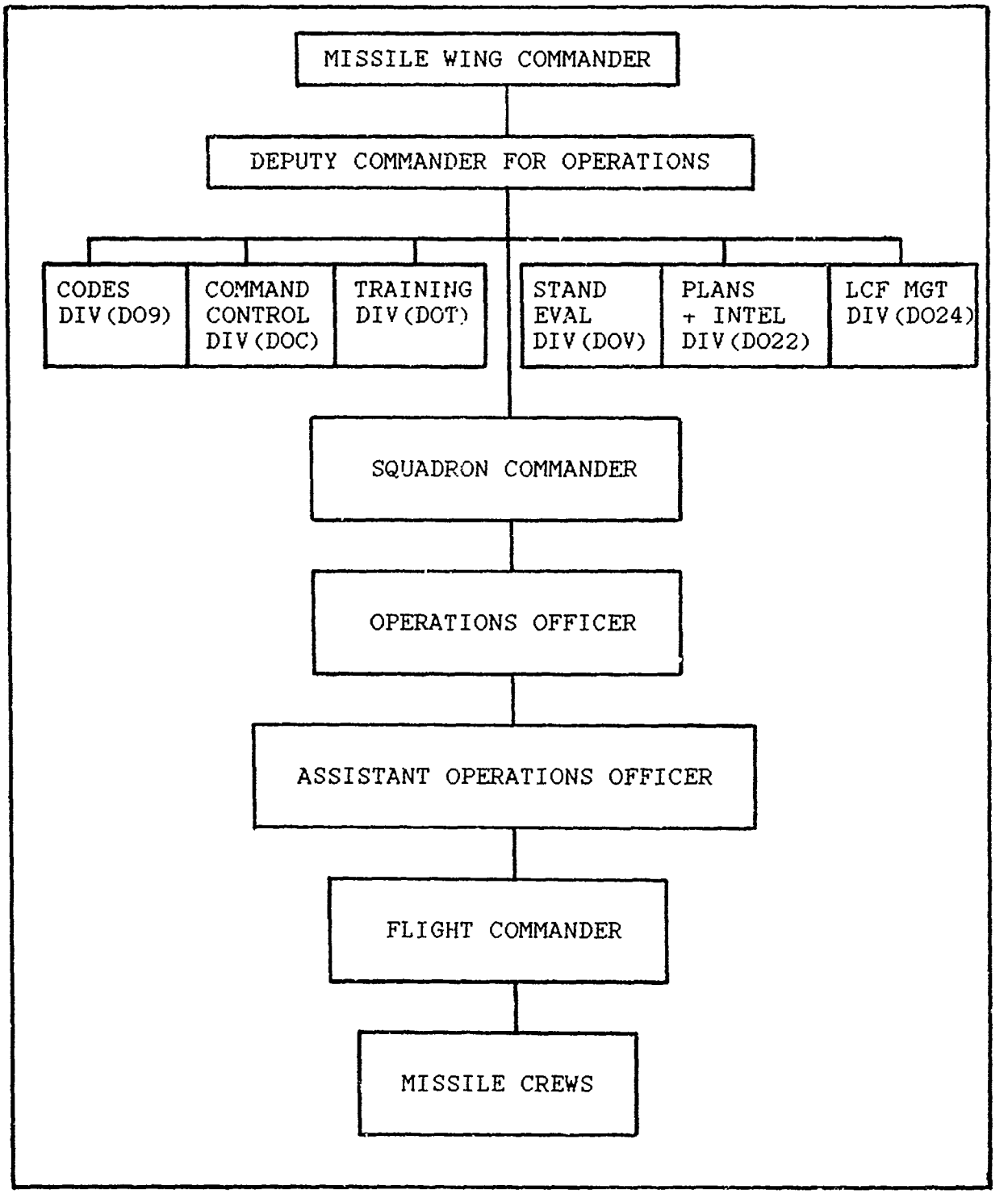

Figure 8. Unit Operations Organization (24:26).

documents, and intelligence information. EWO is the most essential part of the crewmember's job. Proper understanding of EWO concepts and procedures determines if a crewmember will launch his/her missiles at the proper time and on the correct target (23:39). Because of the critical importance of EWO training, only the best missile crewmembers are selected as EWO instructors.

Command Control Division (DOC). DOC, normally called the Wing Command Post (WCP), serves as the control and information center for the wing, operating 24 hours a day 7 days a week. Crewmembers are required to keep the WCP informed of important activities, status changes, and problems. The WCP is the eyes and ears of the wing commander and assists crews on alert in resolving emergency situations. WCP controllers are trained to make quick, correct decisions in emergency situations and thus must be knowledgeable in all areas of base and wing operations (22:11-12; 23:39).

Codes Division (DO9). The Codes Division is responsible for the receipt, security, and handling of code components. Code components are encryption devices, hardware and software, installed in equipment panels at missile launch facilities and launch control facilities. They perform the two essential functions of positive weapon control and nuclear safety. In other words, code components ensure the missile does not launch until the crew reacts to authorized execution orders. Codes officers install the code components into equipment panels at the base and crewmembers transport the panels to the launch control center and install them in equipment racks. Codes officers also conduct monthly training classes to ensure crewmembers can properly handle and control code materials (46:--).

3901st Strategic Missile Evaluation Squadron (SMES)

The 3901 SMES, located at Vandenberg AFB, California, is responsible for conducting evaluations of Initial Qualification Training students; evaluations of crew proficiency, training, and standardization at the wings; and the administration of the annual SAC Missile Combat Competition (12:--). A tour of duty at the 3901 SMES is an excellent opportunity for missile operations officers to gain valuable staff experience after their missile crew tour. Selection for duty with the 3901 SMES is very competitive and unit evaluator and/or instructor experience is highly desirable.

Airborne Launch Control System (ALCS)

ALCS is the airborne backup launch system for the ICBM force should the ground-based launch control centers be destroyed.

There are two squadrons performing ALCS duty, the 4th Airborne Command Control Squadron (ACCS) at Ellsworth AFB, South Dakota, and the 2 ACCS at Offutt AFB, Nebraska. The 4 ACCS is responsible for alert sorties at Ellsworth and at Minot AFB, North Dakota, where crews deploy for a week at a time. The 2 ACCS is responsible for ALCS support of the SAC Airborne Command Post, an around-the-clock operation (23:47). ALCS duty provides missile operations officers the opportunity to fly (and receive additional pay) and broaden their missile experience.

Top Hand

Top Hand is a program established to provide highly skilled missile officers the opportunity to participate in the SAC Follow-on Operational Test and Evaluation mission and subsequently provide HQ SAC with a resource pool of officers experienced in ICBM test and evaluation. A Top Hand assignment with the 1st Strategic Aerospace Division at Vandenberg AFB, California, is very challenging and includes training in and exposure to all ICBM weapon systems, active involvement in missile maintenance activities, and learning how to ground and flight test an ICBM (45:--).

Numbered Air Force Headquarters

Missile positions are available at Eighth Air Force, Barksdale AFB, Louisiana, and Fifteenth Air Force, March AFB, California. The missile positions at the numbered air forces are limited in number and thus somewhat difficult to obtain. However, they do offer an opportunity to gain valuable staff experience (23:47).

HQ SAC

An assignment sought after by many missile operations personnel is to the major command headquarters at Offutt AFB, Nebraska. There are many jobs throughout the staff at HQ SAC for missileers. Most involve action/staff officer duties. These positions offer considerable responsibility and the opportunity to work with senior officers (23:48). Positions at HQ SAC are highly competitive.

Joint Strategic Target Planning Staff (JSTPS)

Co-located with SAC Headquarters at Offutt AFB, Nebraska, the JSTPS develops the Single Integrated Operational Plan (SIOP). The SIOP is the nation's strategic war plan and establishes what weapon systems will be targeted against what targets. The missile jobs at the JSTPS provide an excellent opportunity to work with members from other services and gain a broader picture

of our strategic forces. There are several highly sought after missile positions at the JSTPS (23:48).

Air Staff

The top of the ladder is the Air Staff. The Air Staff is located in Washington, DC, at Headquarters USAF in the Pentagon. Air Staff action officers are experts in their area of responsibility and contribute to Air Force policy decisions. The duty is high-pressure, high-risk, and holds potential for high reward (23:49).

SUMMARY

The follow-on assignments just described are but a few of the career options available in missile operations. They serve to illustrate the variety and challenge of a career in missiles. Many of these assignments are selectively manned and may require instructor and/or evaluator crew experience. Thus, how well an individual does as a crewmember has a strong influence on what assignment he/she can anticipate. As in other career fields, performance determines who gets the better assignments.

Chapter Three

QUALIFICATIONS, TRAINING, AND EVALUATIONS

QUALIFICATIONS FOR MISSILE DUTY

There are no specific technical background qualifications required to enter the missile operations career field; missile officers learn all the technical skills necessary to perform their duties during the various missile training programs. However, all candidates for missile operations duty must meet certain physical, security, and reliability requirements (25:14-15).

Physical Requirements (AFR 160-43)

Missile launch officers must meet certain medical standards beyond those for officer commissioning. These requirements are as follows (15:15, 100-101):

1. Normal color vision
2. Normal hearing
3. No defect that would interfere with the wearing of oxygen equipment, protective head gear, or other safety equipment
4. No speech defect that would interfere with clear enunciation over a radio communication system
5. No medical condition that could incapacitate an individual suddenly and without warning
6. No psychiatric condition that would interfere with missile duty (primarily fear of closed or confined spaces)
7. No character or behavior disorders manifested by a history of repeated or severe difficulties (drug, alcohol, suicide)
8. No condition requiring recurrent use of medication that

could affect mental alertness, physical coordination, or lead to sudden incapacitation

9. Certain allergy disorders that require medication for control may prevent entry into missile operations

10. Missile launch officers must also obtain a satisfactory adaptability rating which assesses the individual's suitability for missile duty

Security Requirements

Individuals entering missile operations duty must receive a Top Secret security clearance based on a favorable background investigation. A Top Secret clearance is mandatory to handle the documents used by missile launch officers (21:8-29).

Personnel Reliability Program (16:--)

Due to the critical responsibilities associated with missile crew duty, extreme caution must be exercised to ensure only reliable, trustworthy individuals are assigned as missile launch control officers. Therefore, all missile crewmembers are subject to the requirements of the Nuclear Weapons Personnel Reliability Program (PRP). The purpose of the PRP is to ensure we select personnel who are emotionally stable and reliable. The program also provides for the removal of individuals of questionable reliability. "Through this program the Air Force significantly reduces the possibility of unauthorized actions that could affect the reliability or performance of our nuclear weapon systems. It is also designed to provide optimum safeguards against personnel-caused nuclear disasters" (25:14-15).

TRAINING

There are two phases of training for missile launch control officers: Initial Qualification Training (IQT) and Unit Training. All entrants to the missile crew force begin their training with IQT at the 4315th Combat Crew Training Squadron (CCTS), Vandenberg AFB, California. After successful completion of IQT, students report to their operational wing for Unit Training.

The 4315 CCTS provides separate IQT courses for each of the five different ICBM weapon systems. These courses vary in length from 12 to 16 weeks (21:8-29 - 8-30). Figure 9 lists the five weapon systems, IQT course lengths, and associated operating bases. There are four areas of IQT instruction leading to combat readiness: academics, Emergency War Order, Missile Procedures Trainer, and specialized training (8:2-1; 23:10). The academic area of instruction takes place in the classroom and provides

WEAPON SYSTEM	IQT COURSE LENGTH	BASES
PEACEKEEPER (WS118A)	15 WKS + 4 DAYS	F.E. WARREN
MINUTEMAN III COMMAND DATA BUFFER (WS133B/CDB)	15 WKS + 4 DAYS	GRAND FORKS MALMSTROM
MINUTEMAN III COMMAND DATA BUFFER (WS133A-M/CDB)	15 WKS + 4 DAYS	F.E. WARREN MINOT
MINUTEMAN II IMPROVED LAUNCH CONTROL SYSTEM (WS133A-M/ILCS)	15 WKS + 4 DAYS	MALMSTROM WHITEMAN
MINUTEMAN II MODERNIZED (WS133A-M)	12 WKS + 2 DAYS	ELLSWORTH

Figure 9. IQT Courses Conducted at the 4315 CCTS, Vandenberg AFB, California (21:8-29 - 8-30).

students with basic information about the weapon system and familiarizes them with their weapon system technical data. During EWO classroom instruction, students learn how to recognize and react to valid missile launch orders. In the MPT, prospective missile crewmembers apply their classroom knowledge to simulated emergencies, equipment malfunctions, and missile launch activities. Specialized instruction received at the 4315 CCTS includes such things as training in firearms, codes, and driver safety (23:10). At the conclusion of training at the 4315 CCTS, student proficiency is evaluated by the 3901 SMES. After successful completion of this evaluation, the students are rated "mission ready" and graduate from the IQT program (7:1-1). They will also be awarded the missile badge (8:8-3). Then they proceed to their operational bases for Unit Training.

Unit Training is a 10-30 day unit orientation program focusing primarily on procedures which are unique to the base. After unit orientation, students demonstrate their knowledge and

understanding of EWO, codes, and nuclear surety concepts to the wing commander or his/her designated representative through a formal certification briefing. They are then combat-ready and prepared to perform alert duties.

EVALUATIONS

Evaluations are conducted by the wing Standardization and Evaluation Division, the 3901 SMES, and by the SAC Inspector General (IG). These evaluations are necessary to ensure missile crewmembers are proficient enough to accomplish their vital mission (23:22).

The wing Standardization and Evaluation Division evaluates each crewmember at least once a year and normally more often. Most evaluations are no-notice and consist of an MPT phase and, less frequently, a launch control center phase (6:--). These evaluations are demanding, thorough reviews of a crewmember's ability (23:22). The best way to get ready for an evaluation is to study, stay up to date with changes, and always be prepared.

The missile wing is also evaluated by the 3901 SMES. Periodic SMES evaluations are known in advance and are a thorough assessment of the wing's ability to perform its mission. Areas evaluated during SMES inspections include standardization and evaluation, weapon system and EWO training, and crew proficiency (6:--). A predetermined number of crews are selected for evaluation by the SMES in the MPT and launch control center. The SMES MPT evaluation counts as a normal standboard check (23:22).

SAC Headquarters also inspects each missile wing's capability to perform its EWO mission. The SAC Operational Readiness Inspection (ORI) is administered by the SAC IG. Crews are observed in the MPT and the launch control center with emphasis on EWO procedures. The IG may also evaluate crew EWO knowledge with classroom tests (23:22).

This may seem like a lot of evaluations and inspections. However, they are necessary to ensure the ICBM crew force can perform its critical mission if called to do so by the President or the National Command Authority. Missile combat crew-members must be proficient in their duties to ensure our ICBM force is a credible deterrent, and evaluations are an effective tool to measure this proficiency.

Chapter Four

BASE LOCATION/INFORMATION

After completing IQT and passing a 3901 SMES evaluation at Vandenberg AFB, the combat-ready missile launch officer reports to his/her operational unit. There are six operational units located at bases in five states (Montana, Missouri, North Dakota, South Dakota, and Wyoming). Figure 10 is a US map indicating the location of the six ICBM bases. This chapter describes the location, activities and attractions, and climatic conditions at each of the missile units.

ELLSWORTH AFB, SOUTH DAKOTA

Location. Ellsworth AFB is located in the southwest portion of South Dakota, 12 miles east of Rapid City. The base is located between the Great Plains and the Black Hills. Rapid City has a population of 51,000 (36:1,35).

Activities and Attractions. Outdoor activities include water sports, mountain climbing, camping, hunting, skiing, snowmobiling, and rockhounding (searching for rocks, minerals, and fossils). Auto racing is one of the largest spectator sports (42:115-116). The area is one of our country's most popular vacation spots (23:13). The scenic attractions include the spectacular western beauty of the Black Hills, Mt. Rushmore, the Badlands, and Devil's Tower in nearby Wyoming (36:2). Many tourist attractions surround Rapid City. Some of the most interesting are the Black Hills Caverns, Museum of Geology, Black Hills Petrified Forest, Black Hills Reptile Gardens, Chapel in the Hills, Crystal Cave Park, Wonderland Cave Natural Park, Sioux Indian Museum, Minnilusa Pioneer Museum, and Dahl Fine Arts Center (42:134-136).

Climatic Information. Ellsworth AFB is situated at a altitude of 3276 feet. Temperatures vary from the 70s and 80s in May through September to the teens in December through February. Average annual high and low temperatures are 58 and 36, respectively. The base gets about 17 inches of rain per year. Average annual snow accumulation is 41 inches. The majority of snow occurs from February through April (26:--).

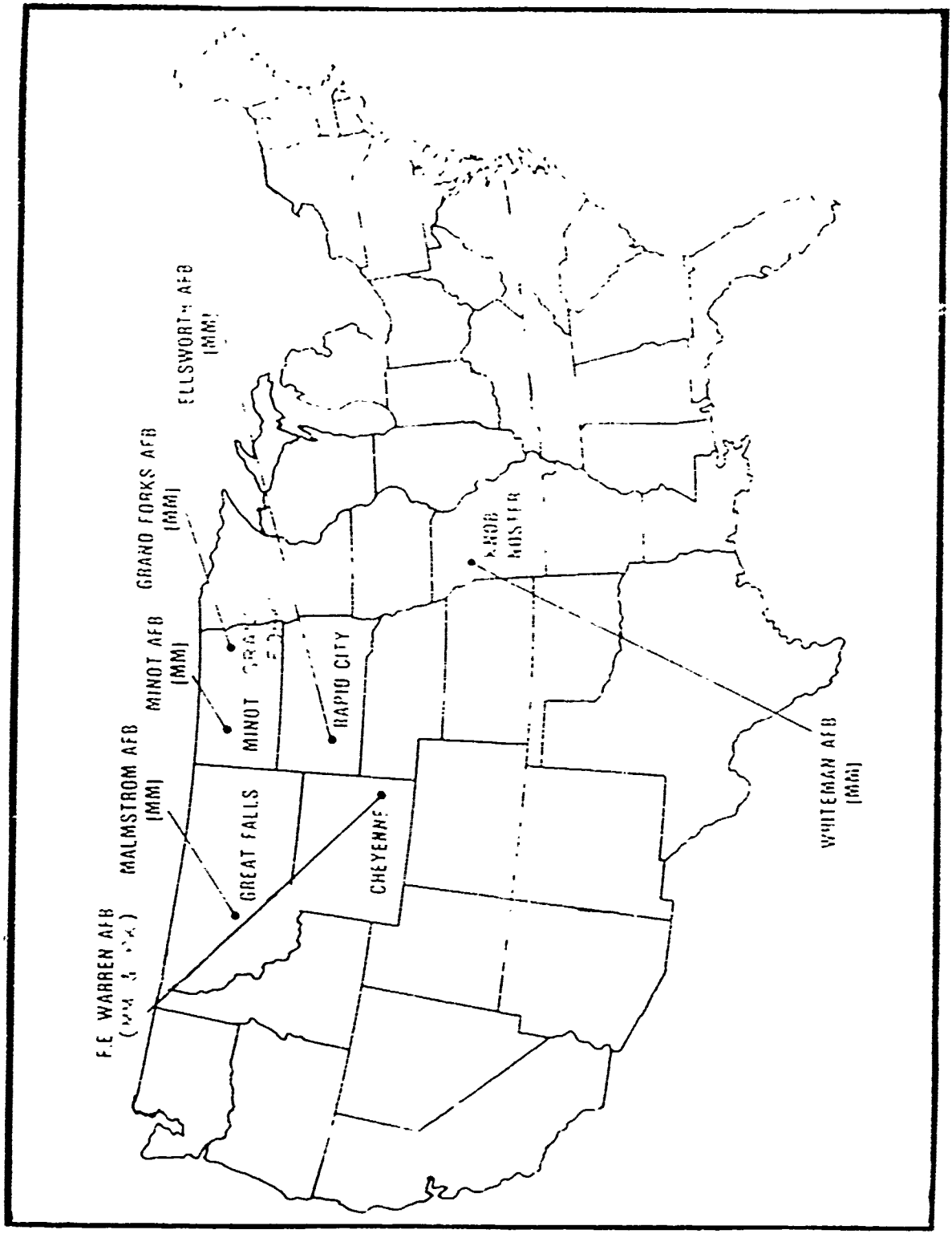

Figure 10. SAC Missile Base Locations (24:11)

F. E. WARREN AFB, WYOMING

Location. Francis E. Warren AFB is located in the southeast corner of Wyoming, next to Cheyenne. Cheyenne is the capital of Wyoming and has a population of over 47,000 (41:60).

Activities and Attractions. Fishing, hunting, boating, water skiing, riding, pack trips, cross-country skiing, downhill skiing, and snowmobiling are some of the most popular outdoor activities in the area (37:3; 41:62-63). There are many attractive vacation spots including Yellowstone National Park, seven national forests, (Bighorn, Black Hills, Bridger, Medicine Bow, Shoshone, Targhee, and Teton), Flaming Gorge, and Bighorn Canyon. Those who prefer the activities of larger towns will not have far to travel. The college town of Fort Collins, Colorado, is 50 miles south while a 2-hour drive will take you to Denver (4:5). There are also local items of interest. Cheyenne Frontier Days attracts about 300,000 visitors each year. This July festivity includes rodeos, old west shows, parades, exhibits, dancing, and country music by famous entertainers. Other attractions include the Historic Governors' Mansion, state capital, and state museum. A few miles up the road is Fort Laramie National Historic Site, which preserves the remains of old Fort Laramie (41:68-69,74).

Climatic Information. F.E. Warren AFB resides at the high altitude of 6166 feet. The average temperature varies from the 70s and 80s in June through September to the teens in December through February. Average annual high and low temperatures are 59 and 33 respectively. Precipitation in the form of rain averages 15 inches per year, with May and June receiving over 2 inches each. Annual average snowfall is 51 inches, with March and April averaging 11 and 9 inches respectively (27:--).

GRAND FORKS AFB, NORTH DAKOTA

Location. Grand Forks AFB is located 15 miles west of the city of Grand Forks. The city is on the North Dakota-Minnesota border at the intersection of the Red Lake River and the Red River, 75 miles north of Fargo, North Dakota, and 145 miles south of Winnipeg, Manitoba (39:i). The city has a population of about 44,000 (42:106).

Activities and Attractions. "The base has many fine recreation opportunities, and the city provides excellent services including shopping, medical and educational facilities" (23:15). The city has several parks covering over 380 acres. There are four golf courses, bike paths, cross-country skiing areas, and skating and hockey rinks, including an indoor ice arena (40:--). The Myra Museum and Campbell House are located in

Grand Forks. They contain furnishings, artifacts, and buildings illustrating life in the Red River Valley in the late 1800s (42:106). "The surrounding area also has much to offer, from excellent hunting and fishing, to sightseeing in large cities like Winnipeg, Canada, only three hours away" (25:15).

Climatic Information. Grand Forks AFB is at an altitude of 911 feet. The average temperature varies from the 70s and 80s in June through September to below zero in December through February. Average annual high and low temperatures are 49 and 29 respectively. The base receives about 19.5 inches of rain per year, with May and June absorbing about 3 inches each. Average annual snowfall is 37 inches, primarily in November through March (28:--).

MALMSTROM AFB, MONTANA

Location. The base is located in west central Montana next to the city of Great Falls. Malmstrom AFB lies in rolling plains about 75 miles east of the Rocky Mountains (5:2). Great Falls has a population around 57,000 (41:48).

Activities and Attractions. Montana, nicknamed the Big Sky Country, is a favorite vacation area due to its spacious beauty. There are 10 national forests covering over 16 million acres in the state. Hunting, fishing, hiking, camping, boating, snow skiing, skating, and sightseeing are some of the prominent outdoor activities in the area (41:31-32). Two of our country's most beautiful national parks, Yellowstone and Glacier, are both nearby. Attractions in Great Falls include the C.M. Russell Museum (displaying the works of the cowboy artist Charles Russell), Paris Gibson Square for Contemporary Arts, and the annual Montana State Fair (41:48).

Climatic Information. The base and the city are at an altitude of 3523 feet. The average temperature varies from the 70s and 80s in June through September to the teens in December through February. Average annual high and low temperatures are 56 and 34 respectively. They get about 14.5 inches of rain per year, with nearly half of that occurring in the spring. Snowfall averages 48 inches per year, most of which occurs in January through March (29:--).

MINOT AFB, NORTH DAKOTA

Location. Minot AFB is located in the north central area of North Dakota known as Roughrider Country, 14 miles from Minot, North Dakota. The city has a population of 35,000 (44:34).

Activities and Attractions. Hunting, fishing, skiing (water and snow), snowmobiling, hockey, and curling are some of the favorite outdoor activities. "The city offers a full schedule of entertainment events throughout the year. Minot has its own symphonic orchestra, opera association, community theater, chamber chorale, and community concert series" (44:35). Major annual events in Minot are Winterfest in February, North Dakota State Fair in July, Norsk Hostfest (a festival of Scandinavian arts, crafts, foods, and entertainment), and Pastaville USA (honoring the noodle and North Dakota farmers who produce the main ingredient in pasta). Major attractions include two national wildlife refuges, the Pioneer Village and Museum, and Roosevelt Park and Zoo (42:109).

Climatic Information. Minot AFB is at altitude of 1666 feet. Temperatures vary from the 70s and 80s in June through September to below zero in December through February. Average annual high and low temperatures are 50 and 29 respectively. Minot AFB receives about 17 inches of rain each year. The month receiving the most rain is June (about 3.5 inches). Snowfall averages 39 inches, primarily from December through April (30:--).

WHITEMAN AFB, MISSOURI

Location. The base is located near the small town of Knob Noster in rolling, agricultural terrain 60 miles southeast of Kansas City (23:14).

Activities and Attractions. The beautiful Ozark Mountains and their lakes and rivers located south of the base provide visitors and native Missourians ample opportunity for outdoor recreation. The state is noted for its superb fishing which is enhanced by the numerous lakes and rivers stocked by the state hatcheries. Kansas City and St. Louis are within easy driving distance and offer excellent shopping facilities and numerous other activities (32:66).

Climatic Information. The altitude at Whitman AFB is 869 feet. The average temperature varies from the mid-80s in June through Septembe to the 20s in December through February. The average annual high and low temperatures are 64 and 45 respectively. Average annual rainfall is 38.4 inches, with May and June receiving over 4 inches each. The base receives about 26 inches of snow each year, mostly in January through March (31:--).

Chapter Five

ICBM WEAPON SYSTEMS

THE PAST

The Minuteman was a direct descendant of earlier, now obsolete systems like the Snark, Thor, Jupiter, Titan I, and Atlas (50:--). These systems..."proved to be generally unreliable, very expensive to operate and maintain, and highly vulnerable to the effects of nuclear blasts. These shortcomings posed a unique challenge to ... Air Force planners and civilian contractors" (25:47). This led to the development of the Titan II and Minuteman systems. The first Titan II went on alert in April 1963, with a total of 54 missiles located at three bases (Davis-Monthan AFB, Arizona; McConnell AFB, Kansas; and Little Rock AFB, Arkansas) by the end of the year (50:39-42). The Titan II was phased out of SAC's inventory in 1987, due primarily to its age. The new generation of Minuteman missiles was lighter, smaller, and had increased range over its predecessors. Minuteman I, the initial version of the Minuteman, was first placed on SAC alert in October 1962 at the 341st Strategic Missile Wing (SMW) at Malmstrom AFB, Montana. The Minuteman I was followed by the Minuteman II which began deployment in 1966. Both the Minuteman I and II were three-stage solid-fueled ICBM systems. By 1967, 1000 Minuteman missiles were deployed in dispersed hardened launch facilities. In 1970, the Air Force began replacing the Minuteman I with a newer version called the Minuteman III. The last Minuteman I was removed from its silo in September 1974 (13:1).

THE PRESENT

Minuteman II

The first Minuteman II went on alert in January 1966 (50:49). Today, SAC has 450 operational Minuteman II missiles at three of the six ICBM units: Malmstrom AFB, Montana; Ellsworth AFB, South Dakota; and Whiteman AFB, Missouri (see Figure 11). Minuteman II is similar to Minuteman I with improvements in range, number of targets it can store in its guidance memory, accuracy, and ability to carry a larger payload (13:1-2). It is a

WING #	BASE	STRATEGIC MISSILE (SMW)	MISSILES			CONTROL SYSTEM
			MMII	MMIII	PCKR	
1	Malmstrom	341 SMW	150		--	Improved Launch Control System
			-	50	-	Command Data Buffer
2	Ellsworth	44 SMW	150	-	-	Minuteman Modernized
3	Minot	91 SMW	-	150	-	Command Data Buffer
4	Whiteman	351 SMW	150	-	-	Improved Launch Control System
5	F.E. Warren	90 SMW	-	150*	-	Command Data Buffer
			-	-	50*	Peacekeeper
6	Grand Forks	321 SMW	-	150	-	Command Data Buffer

*These numbers reflect the planned force structure in 1989, when all 50 Peacekeepers are deployed.

Figure 11. Missile Wing Configurations (47:2-15).

three-stage, solid propellant, inertially guided system with a range of over 6300 miles. The Minuteman II, like all of our present ICBM systems, is stored ready to launch in buried, unmanned, hardened launch facilities. A minimum of three miles separate each of the missile launch facilities (LF) and the manned launch control center (LCC). The missile can be launched from either the ground launch control center or from an airborne launch control system (1:145). Figure 12 describes the Minuteman II missile.

Minuteman III

The newest version of the Minuteman series of missiles is the Minuteman III. It uses the same first and second stage as the Minuteman II, but it has a larger third stage to permit delivery of a larger payload. It can accommodate up to three multiple, independently targetable reentry vehicles (MIRVs). The Minuteman III also has the capability to carry penetration aids to protect the reentry vehicles from enemy anti-ballistic missile systems (13:2). The Minuteman III system began standing alert in August 1970 with full deployment of 550 missiles completed in July 1975 (50:56,62). Minuteman III missiles are located at Malmstrom AFB, Montana; Minot AFB, North Dakota; F.E. Warren AFB, Wyoming; and Grand Forks AFB, North Dakota (47:2-15) (see Figure 8). Fifty of the Minuteman III missiles are in the process of being replaced by the newer and larger Peacekeeper missile. A drawing of a Minuteman III is at Figure 13.

Peacekeeper

The Peacekeeper, formerly known as the MX, is the newest operational ICBM. It has four stages designed to deliver up to 10 reentry vehicles to independent targets at ranges greater than 5000 miles. Three of the four stages use solid propellant while the fourth stage, called the post-boost vehicle, uses liquid propellants. The post-boost vehicle also contains the guidance and control system, deployment module, and reentry vehicles. The deployment module houses the reentry vehicles and provides the electronics to deploy them (47:2-16) (see Figure 14). It is considerably larger than the Minuteman III (see Figure 15). The entire Peacekeeper missile is encased in a canister and placed in a Minuteman silo. During launch, a gas generator forces the missile out of the canister and silo and the Peacekeeper rocket motors ignite when the missile is above the ground. This technique is called "cold launch" and protects the missile from damage when exiting the silo. A picture of a Peacekeeper test launch is at Figure 16. The first Peacekeeper missile was placed on alert in September 1986. All 50 Peacekeepers are scheduled to be operational at F.E. Warren AFB, Wyoming, in fiscal year 1989 (35:-).

THE FUTURE

Peacekeeper Rail Garrison (43:--)

Our present ICBM force is deployed in fixed-location silos which make enemy targeting relatively simple. In an effort to complicate the enemy's targeting and thus enhance the survivability of our ICBMs, the Air Force is developing a new mobile system. The Peacekeeper Rail Garrison system is a

MINUTEMAN II FACTS (LGM 30F)

3 stage missile approximately 58 feet in length, including penetration aids wafer and reentry vehicle.

STAGE	LENGTH (ft)	DIAMETER (ft)
1	24	5.5
2	14	4.3
3	7	3

All stages use solid propellant

After launch from the underground silo, the missile rises vertically for several seconds and then through the inertial guidance system begins pitch program. During second and third stages of flight yaw and roll are accomplished for final alignment. The missile reaches speeds in excess of 16,000 MPH and at termination of third stage thrust the RV separates and continues to the target.

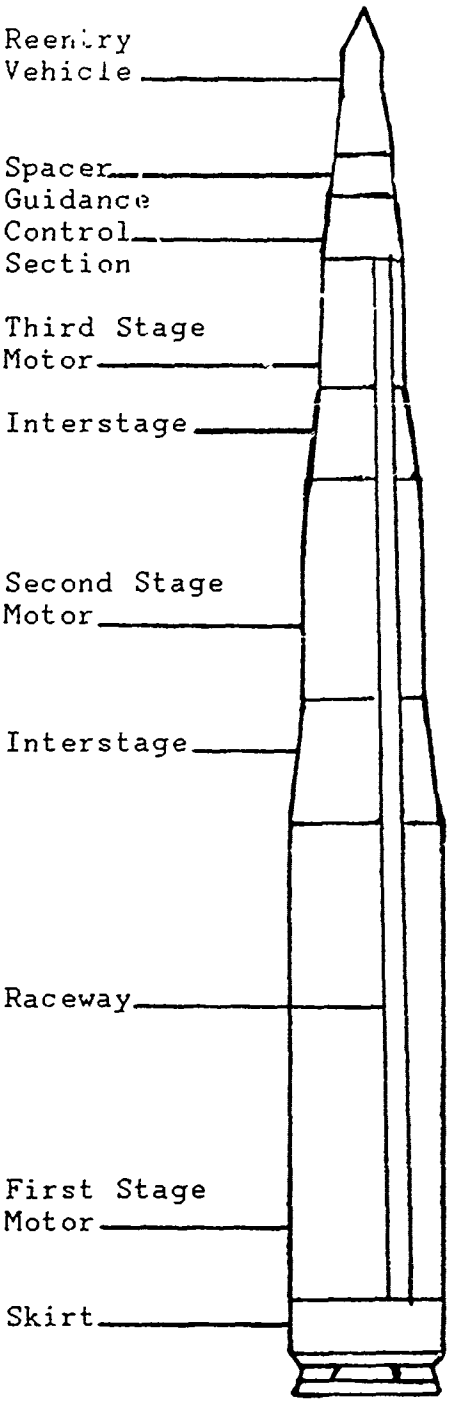

Figure 12. Minuteman II (47:2-2)

MINUTEMAN III FACTS (LGM 30G)

3 stage missile approximately 60 feet in length, including reentry system comprised of multiple independently targetable reentry vehicles (MIRV) and penetration aids.

STAGE	LENGTH (ft)	DIAMETER (ft)
1	24	5.5
2	14	4.3
3	7.3	4.3
SHROUD	12	4.3 (base)

Stage 1, 2, and 3 use solid propellant. The Propulsion System Rocket Engine uses hypergolic fuel, monomethylhydrazine and nitrogen tetroxide.

After launch from the underground silo, the missile rises vertically for several seconds and then begins a pitch program. During second and third stages of flight, yaw and roll are accomplished for final alignment. The missile reaches speeds in excess of 16,000 MPH and at termination of third stage thrust, the PSRE begins maneuvering for deployment of reentry vehicles and penetration aids.

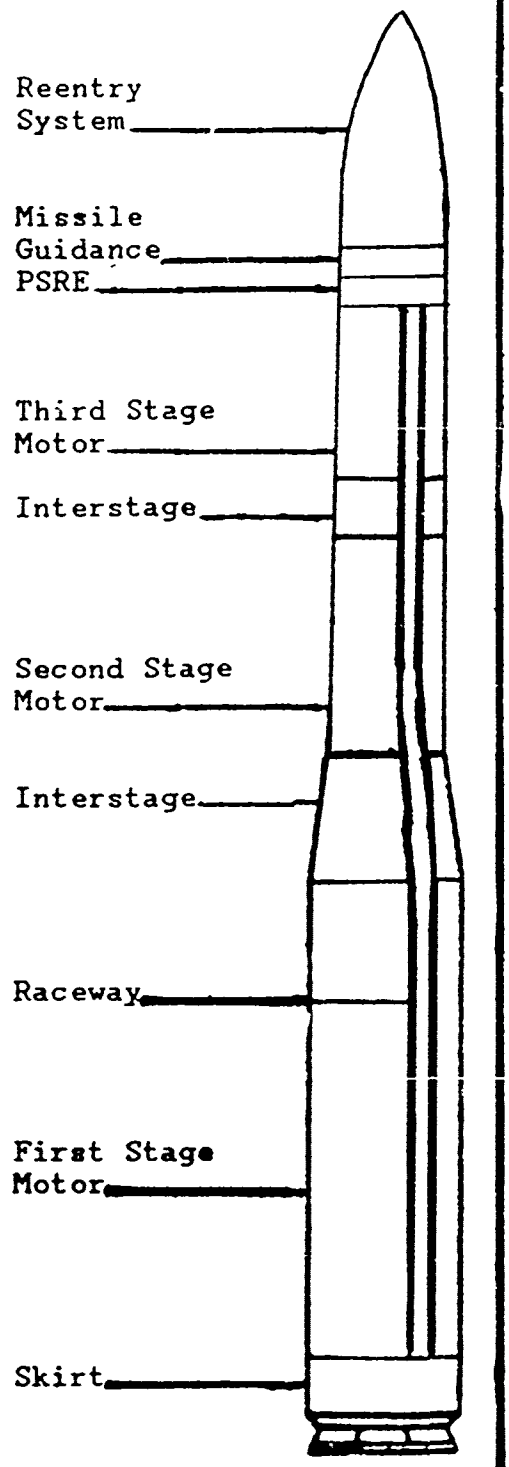

Figure 13. Minuteman III (47:2-4).

PEACEKEEPER FACTS LGM-118A

The Peacekeeper is 70.5 feet long, 92 inches in diameter, weights 190,000 pounds, and carries a 7,940 pound payload which includes 10 Mark 21 RV's. The entire missile will be encased in a canister to protect it against damage and permit "cold launch" of the vehicle.

The missile has three solid propellant rocket motors and a post-boost vehicle (PBV) that serves as a fourth stage. This PBV has three major elements:

-- A guidance and control system consisting of the advanced inertial reference sphere (AIRS) and a new computer that improves accuracy and rapid retargeting capability.

-- A post-boost propulsion system (PBPS) that uses liquid propellants, monomethylhydraizne and nitrogen tetroxide. This PBPS provides additional range and accuracy as it maneuvers the deployment module.

-- A deployment module which is a platform to hold and dispense the RV's.

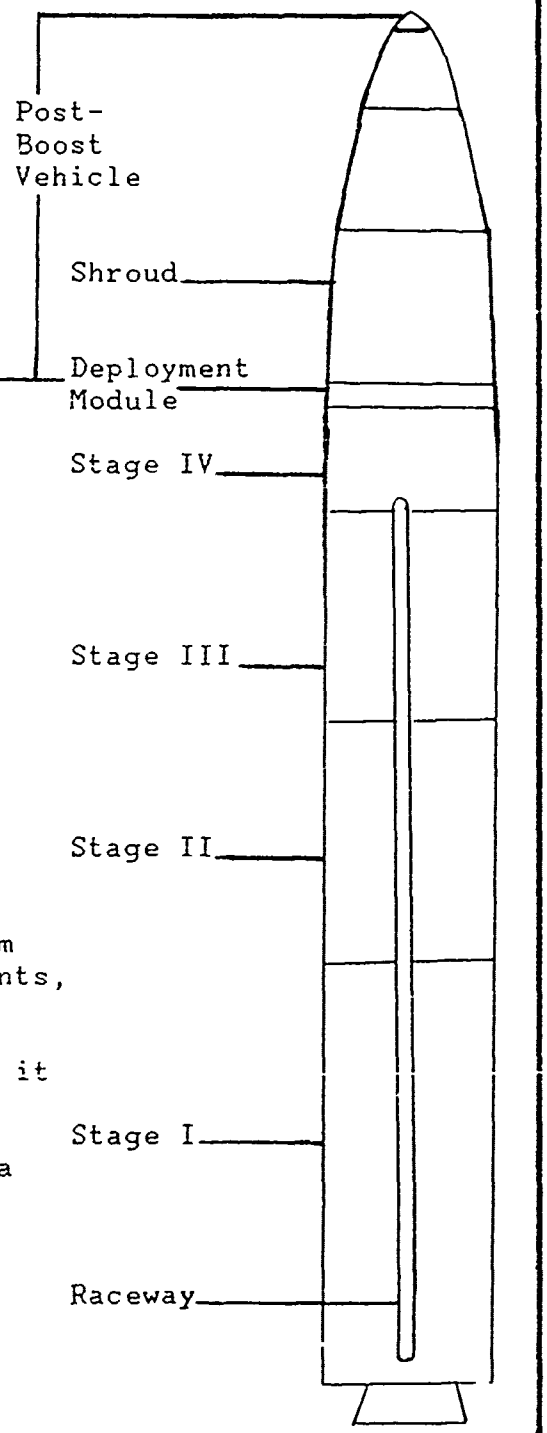

Figure 14. Peacekeeper (47:2-6)

	MM II	MM III	PCKR
Stages	3	3	4
Propulsion	Solid	Solid	Solid (Note 1)
Guidance	Inertial	Inertial	Inertial
Reentry Vehicles (max)	1	3	10
Range	Over 6,300	Over 6,300	Over 5,000
Length	58 feet	60 feet	70.5 feet
Diameter (max)	66 inches	66 inches	92 inches
Weight	73,000 lbs	78,000 lbs	195,000 lbs
Missiles Deployed	450	500(Note 2)	50(Note 2)

Note 1. First three stages are solid propellant rocket motors, the fourth stage is liquid fueled.

Note 2. These numbers reflect the planned force structure in 1989. Originally 550 MM III missiles were deployed. The 50 Peacekeepers are replacing 50 of the MM III missiles at F.E. Warren AFB, WY.

Figure 15. Current Weapon System Characteristics (47:2-1 - 2-4, 2-16; 3:--).

rail-mobile, garrison-based ICBM system consisting of Peacekeeper missiles and associated equipment and facilities. The operations concept consists of 50 missiles deployed on 25 trains, 2 missiles per train. The trains are sheltered in approximately seven garrisons with each garrison housing three or four trains. The garrisons will be located at several Air Force bases with F.E. Warren AFB, Wyoming serving as the main operating base. During normal day-to-day activities the trains will be parked in igloos in the garrisons. The missiles will be on continuous alert in the garrisons. Control and monitoring of the missiles is performed by combat crews on board the train. Upon receiving a

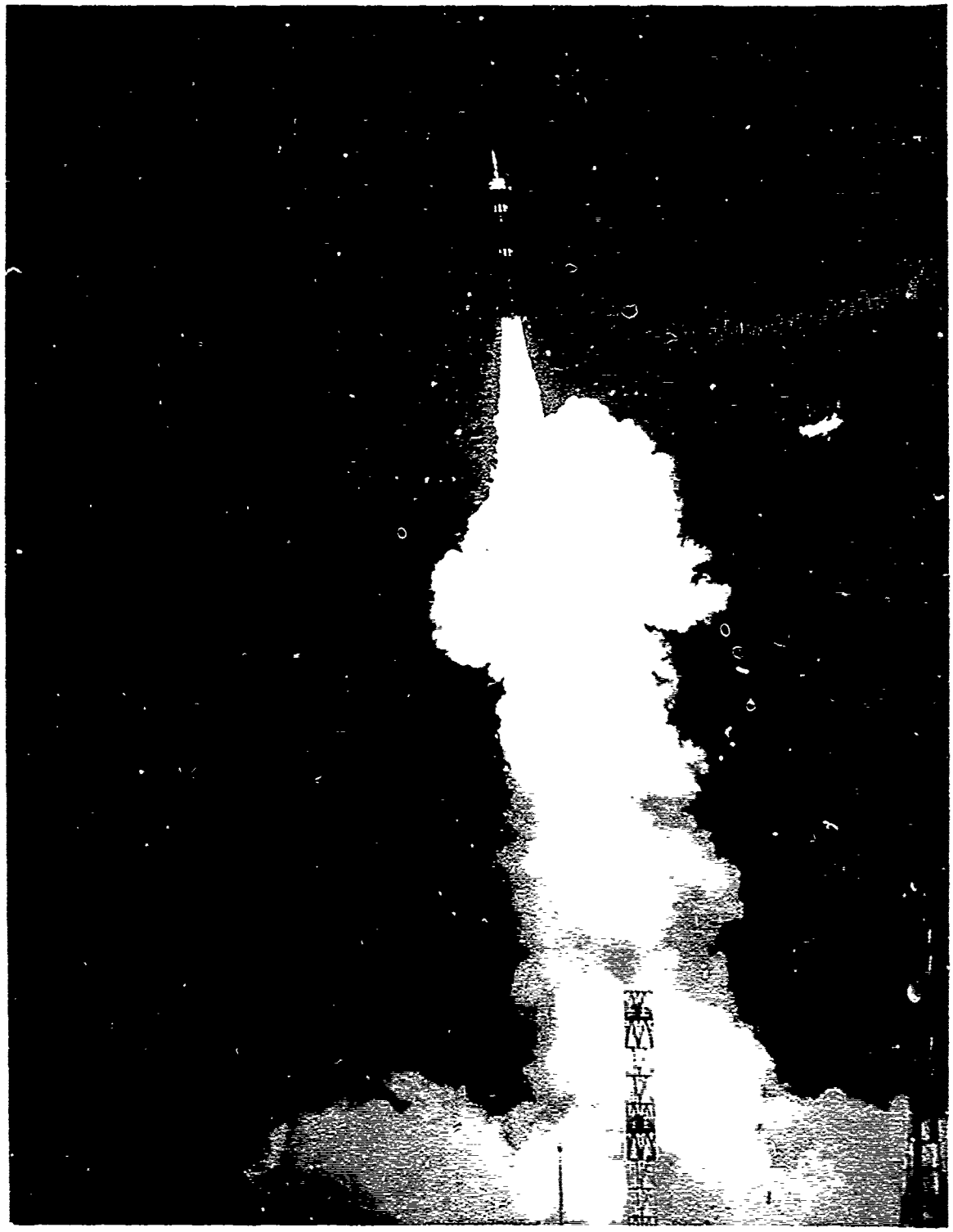

Figure 16. Peacekeeper Test Launch (54:--).

dispersal directive from higher authority, the trains leave the garrisons and disperse along the commercial rail network. The system provides a prompt launch capability in both the garrison and dispersed modes. Missile launch can be accomplished from any location by the missile combat crews on board each train. Figure 17 depicts a missile launch scenario for the Rail Garrison concept.

Small ICBM (52:--)

The Small ICBM is a mobile, single warhead missile with intercontinental range being developed for long-term nuclear deterrence. This new weapon system increases survivability through mobile basing and also enhances stability by providing a low-value target (only one reentry vehicle). The missile will be approximately 53 feet long, 46 inches in diameter, and weigh around 37,000 lbs. Its size permits flexibility of mobile basing in hard mobile launchers (HML) at Minuteman launch facilities and/or in a random movement complex. The HML concept at Minuteman facilities calls for the Small ICBM to be housed in a hard mobile launcher and stored in a shelter within the secure fenced area surrounding Minuteman launch facilities. Upon receiving tactical warning, the HMLs would disperse using existing roads (or possibly off-road) and be capable of rapidly relocating and surviving nearby nuclear attacks. An alternative basing concept proposes the random movement of the HMLs on federally controlled areas in the Southwest US, far from existing Minuteman or Peacekeeper missile bases.

Several command and control concepts are being investigated to support the Small ICBM. These concepts include a single central launch control center, several small ground control units deployed in the dispersed area, the airborne launch control system, or combinations of the above. The Small ICBM and hard mobile launcher are illustrated in Figures 18 and 19 respectively.

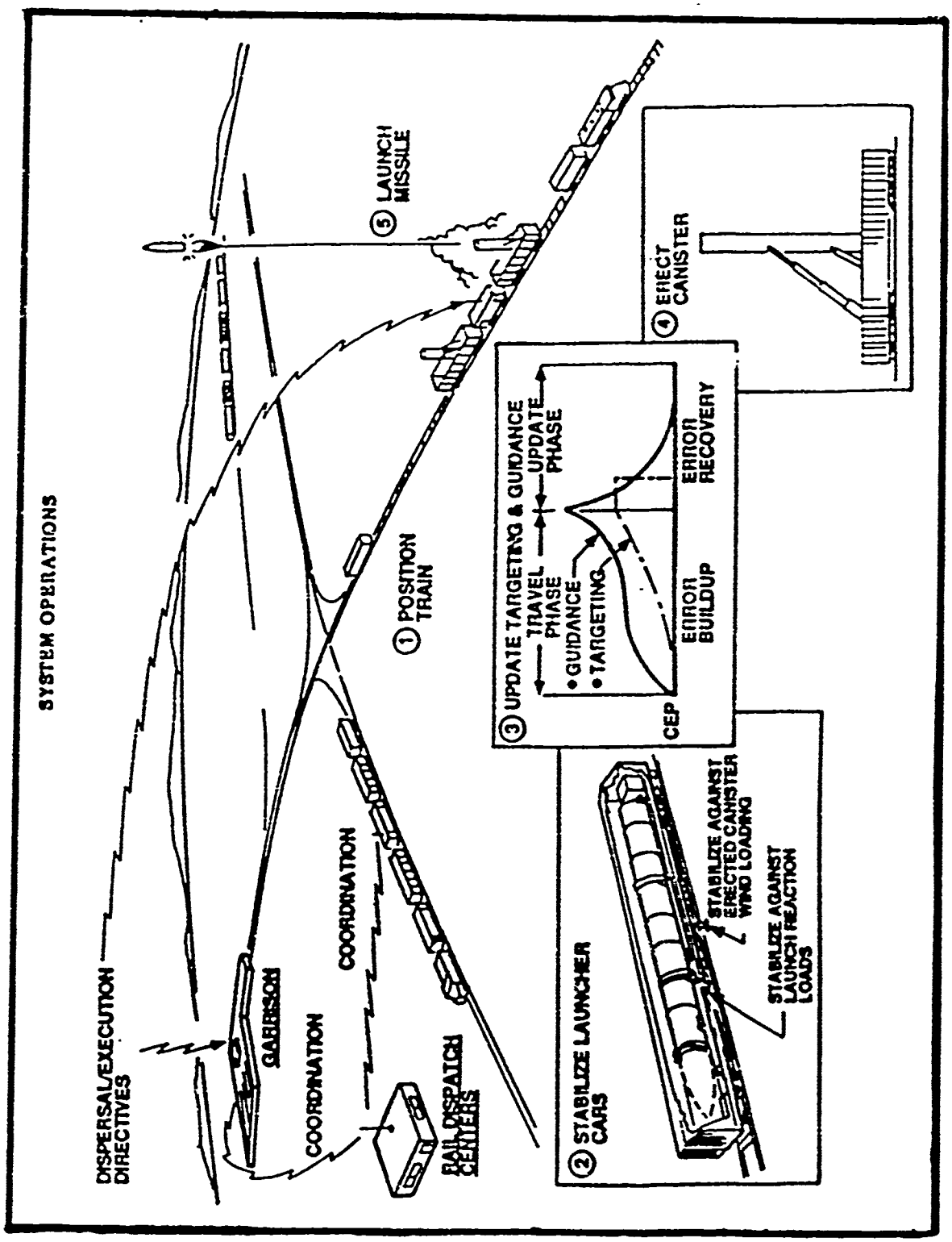

Figure 17. Peacekeeper Rail Garrison Launch Scenario (49:--).

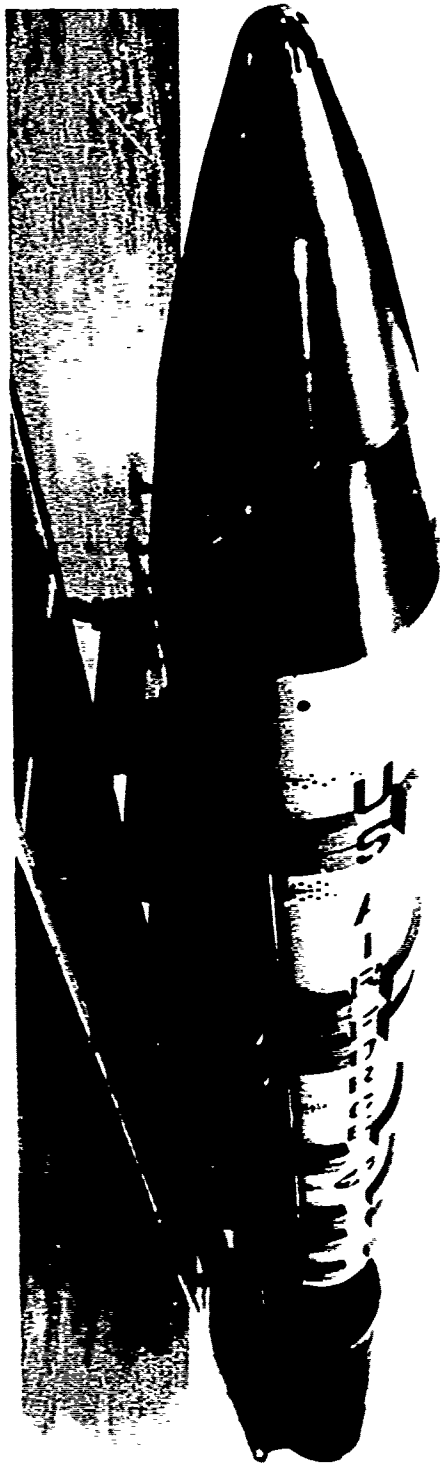

Figure 18. Small ICBM (49:--)

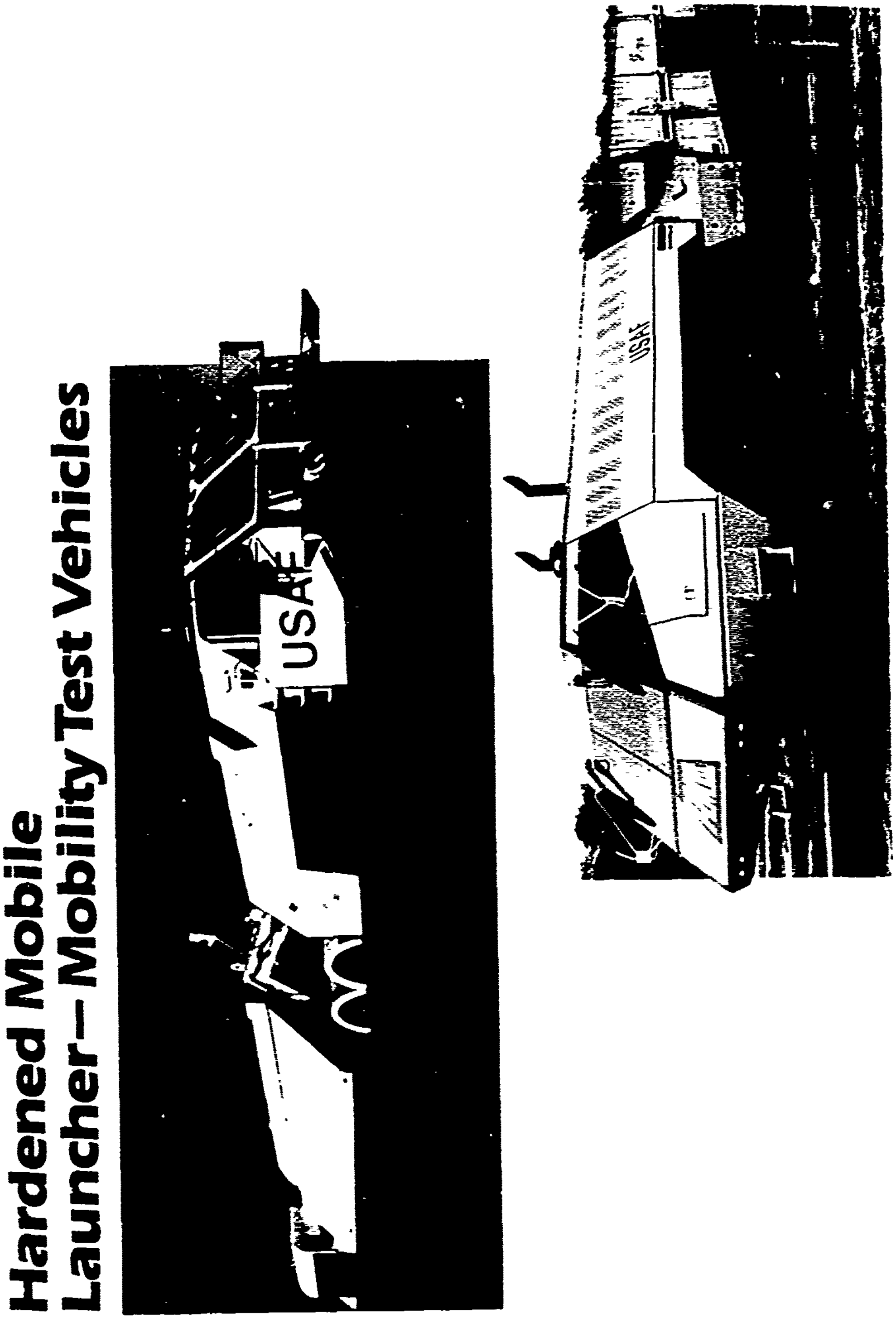

Figure 19. Small ICBM Hard Mobile Launcher Test Vehicles (49:-).

CONCLUSION

There are many career fields to choose from in the Air Force, both for the new second lieutenant and the more senior company grade officer seeking to broaden his/her experience. Hopefully, this handbook has provided sufficient information to assist those men and women who are interested in missile operations to decide if missiles are right for them. It is not intended to describe everything about missile duty, but only to present a general overview and initial insight into the duties, responsibilities, and opportunities of the missile officer. If you believe a future edition should include information not contained in this handbook or that information presented in this handbook should be deleted, please send your recommendations to HQ SAC/DPXPM, Offutt AFB, Nebraska, 68113-5001.

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APPENDIX

GRADUATE SCHOOLS PARTICIPATING IN THE MCMEP

ELLSWORTH AFB, SOUTH DAKOTA
AUTOVON 675-2312

UNIVERSITY	DEGREE	CURRICULUM
SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY	MS/PhD	ENGINEERING MANAGEMENT FULL CURRICULUM RANGE ON CAMPUS
SOUTH DAKOTA UNIV	MEd	TEACHER EDUCATION PUBLIC SCHOOL ADMINISTRATION
	MS	GUIDANCE AND COUNSELING
UNIV OF SOUTH DAKOTA	MA	POLITICAL SCIENCE
	MBA	BUSINESS ADMINISTRATION
	MPA	PUBLIC ADMINISTRATION

F.E. WARREN AFB, WYOMING
AUTOVON 481-3577

COLORADO STATE UNIV	MBA	BUSINESS ADMINISTRATION
	MS	MANAGEMENT ENGINEERING MANAGEMENT ENGINEERING COMPUTER SCIENCE FULL CURRICULUM RANGE ON CAMPUS
LESLEY COLLEGE	MA	COUNSELING PSYCHOLOGY
	MS	MANAGEMENT (HUMAN RESOURCE DEVELOPMENT AND MICROCOMPUTERS)
NOVA UNIV	PhD	EDUCATION
UNIV OF NORTHERN COLORADO	MA	GUIDANCE AND COUNSELING HUMAN RELATIONS PUBLIC ADMINISTRATION
UNIV OF WYOMING	MPA	PUBLIC ADMINISTRATION FULL CURRICULUM RANGE ON CAMPUS

GRAND FORKS AFB, NORTH DAKOTA
AUTOVON 362-3316

UNIVERSITY	DEGREE	CURRICULUM
CENTRAL MICHIGAN UNIV	MS	ADMINISTRATION (GENERAL AND HEALTH SERVICES ADMIN)
EMBRY-RIDDLE AERONAUTICAL UNIVERSITY	MS	AVIATION MANAGEMENT AERONAUTICAL SCIENCE
UNIV OF IDAHO (VIDEO OUTREACH PROGRAM)	MS	ELECTRICAL ENGINEERING MECHANICAL ENGINEERING COMPUTER SCIENCE
UNIV OF NORTH DAKOTA	MBA MS	BUSINESS ADMINISTRATION SPACE STUDIES FULL CURRICULUM RANGE ON CAMPUS

MALMSTROM AFB, MONTANA
AUTOVON 632-2531

COLLEGE OF GREAT FALLS	MS	HUMAN SERVICES
NORTHERN MONTANA COLLEGE	MA	GUIDANCE AND COUNSELING
UNIV OF IDAHO (VIDEO OUTREACH PROGRAM)	MS	ELECTRICAL ENGINEERING MECHANICAL ENGINEERING COMPUTER SCIENCE
UNIV OF MONTANA	MBA MS	BUSINESS ADMINISTRATION ADMINISTRATION
UNIV OF S. CALIFORNIA	MS	SYSTEMS MANAGEMENT

CONTINUED

MINOT AFB, NORTH DAKOTA
AUTOVON 344-2772

UNIVERSITY	DEGREE	CURRICULUM
CENTRAL MICHIGAN UNIV	MA	ADMINISTRATION HUMAN RESOURCES MANAGEMENT
MINOT STATE COLLEGE		FULL CURRICULUM RANGE ON CAMPUS
UNIV OF NORTH DAKOTA	MS	BUSINESS ADMINISTRATION SPACE STUDIES

WHITEMAN AFB, MISSOURI
AUTOVON 975-3539

CENTRAL MISSOURI STATE UNIV	MA	CRIMINAL JUSTICE
	MBA	BUSINESS ADMINISTRATION
	MS	INDUSTRIAL SAFETY SAFETY MANAGEMENT FULL CURRICULUM RANGE ON CAMPUS
UNIV OF MISSOURI-COLUMBIA	MBA	BUSINESS ADMINISTRATION